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Adoption of New Technologies in Instructional Design: A Case Study of Communications Faculty at Florida Community College at Jacksonville Integrating an Instructional Web Based Writing Tool, My ACCESS into Communications Courses

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Adoption of New Technologies in Instructional Design: A Case Study of Communications Faculty at Florida Community College at Jacksonville Integrating an Instructional Web Based Writing Tool, My ACCESS into Communications Courses

by

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Dedication

This dissertation is dedicated to my husband, Darrell W. Moore, my better half for believing in me **Philippians 4:13** (***I can do all things through Christ who strengthens me***), and always supporting me, for my wonderful daughter Melanie who spent a year in Austin hanging out with Mommy; for my two teenage sons Quentin for your love and support, and Jeremy for your love and support, and Big Mommy, my mother (I love you . . . I couldn't have done it without you strengthening my heart).

To my Austin family who welcomed and supported me, I'm eternally grateful . . .

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Adoption of New Technologies in Instructional Design: A Case Study of Communications Faculty at Florida Community College at Jacksonville Integrating an Instructional Web Based Writing Tool, My ACCESS into Communications Courses

Publication No. _____

Mable J. Moore, Ph.D.
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The purpose of this study was to gather the perceptions of faculty in focus groups and individual interviews as they adopt new technology over time. My ACCESS, a Web based instructional writing tool was introduced to the faculty during the course of the four-month study. A frustration often conveyed by faculty in dealing with technology is time and the technical expertise required to understand computer-based technology and its relevance to improving the teaching and learning process, compounded by the problem of having little or no research data available to support the claims of its effectiveness (Dawes, 2001). Specifically, this study presents data that has been collected, recorded, and analyzed for the purpose of describing the adoption process of how communications faculty at Florida Community College at Jacksonville (FCCJ) adopt new technology over time. Full-time communications faculty who teach writing in their courses (Reading, English, Developmental, Adult Basic Education, and GED) were included in the study. Instructional design theories (adoption, learning, and motivation theories) were compared to the perceptions and experiences of the communications faculty that participated in the study.

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Introduction to the Study

Background

Artificial Intelligence . . .

> The first is to use artificial intelligence (AI) and cognitive science techniques to model experts who problem solve in a domain, as well as tutors teaching and students learning in that domain. . . . The second research goal involves explaining learning and teaching as parts of the human information-processing system. . . . The third research goal is to demonstrate completeness and reliability in the engineering side of the discipline and to show that intelligent instructional systems can be used effectively in training and classroom situations.
>
> (Shapiro, Stuart C. (1992). Encyclopedia of Artificial Intelligence. 2nd ed. New York: John Wiley & Sons. (1), 434).

Information technology has become integrated into virtually every aspect of higher education. The technology infrastructure consists of networks, databases, hardware, and a plethora of software needed to maintain academic and administrative computing including financial student records, library services, distance learning services, communication and network services, and teaching and learning for students. With technology costs changing rapidly, it's extremely difficult to calculate an absolute value of technology services for the institution. "However developing rational and viable financial strategies to accommodate effective long-term and short-term technological change is imperative" (Oberlin, 1996, p. 10). Any plan for technology will require collaboration among academic, financial, technical leaders, trustees, and the collective wisdom of the college's leadership team including division chairs, faculty, staff, and students – all constituents with vested interests in the long-term success and expansion of technology on campus.

"Community colleges (CC) have held fast to their commitment to access" (Community College Press, 2001, p. 11). Community colleges have prepared much of the skilled workforce that has made possible the nation's expansion and growth. "Community colleges continue to struggle to reduce barriers to higher education, to meet students where they are, and to develop a curriculum to meet expanding cultural, personal, economic, and societal needs" (Roueche & Roueche, 1993, p. vii).

"Dealing with the rate of change is the paradox of information technology planning. Information technology is simply too integrated into most institutions to be isolatable as a variable" (Dempsey, J., Dvorak, E. E., et. al. 1998, p. 126). Technology and financial planning must support the evolution of technological change so that the campus can optimize technology investments over time. The funding priorities for technology must be flexible, and easy to modify.

"Community colleges have spent millions investing in information technology to improve the computing infrastructure of the campus and to support all aspects of the campus' technology operations. A large portion of the costs supported the introduction and use of new technology in the classroom. Students who are served demand such technology and future employers demand technology literate employees" (Ayers & Doherty, 2003, p. 1). As colleges and faculty shift from pioneering to integrating instructional technology across the institution and the college's curriculums, the need for locally providing and sustaining training and support for the technology infrastructure becomes much more essential. Milliron and Miles (2000) point out, technology offers a much wider range of possibilities for teaching and learning:

> The true power of these Internet technologies in education may lie not only in distance and asynchronous learning, but also in their ability to foster hybrid

models of interactive learning involving in-class, online, faculty-driven, student-driven, synchronous, and asynchronous options (Milliron & Miles, 2000).

Introduction

In Hermann's (1991) article , *Evaluating Computer-Supported Writing,*" she writes, "unfortunately, while writing teachers and researchers in the field of composition have become increasingly involved with the question of writing assessment, computers and composition specialists have virtually ignored this area of research" (In Huot, B. 1996, p. 231).

> In the late 1960's, Ellis Page led a group of compositions specialists in developing a radical technological alternative to grading written essays. Page proposed designing computer systems that would access student essays by correlating technical variables (word length, spelling errors, essay length) with intrinsic values of human graders such as aptness of word choice (Wresch, 1994). Page devised his system to relieve English teachers of the "backbreaking burden" of manually grading essays. Interestingly, Page was so certain that his new assessment plan would catch on that he envisioned a day in the near future when teachers not grading essays by computers would represent "surviving pockets of antiquity" (p. 46).

Though Page's initiatives did not catch on as quickly or easily as he hoped, forty-four years later, researchers and businesses, like Vantage Learning (www.vantage.com) are again singing the praises of computerized essays driven by artificial intelligence. Page may have been overly optimistic in his plan to replace human graders with computers, but he was entirely accurate in presuming that the computer would forever change the ways students' writing is read and graded (In Huot, B. 1996, p. 236).

The Technology Debate

Milliron (2001) addresses the challenges many colleges face in attempting to integrate technology in that he points out that, often times, colleges adopt technology in a haphazard way, and do not link technology planning with fundamental educational purposes of the college (p. 1). These expectations for technology integration call for new instructional design theories.

The Role of Instructional Design Theory

Instructional-design theory as defined by Reigeluth (1999) is "a theory that offers explicit guidance on how to better help people learn and develop" (p. 5). Frick and Reigeluth (1999) argue that more instructional design theories are needed to provide guidance and direction for additional kinds of learning and development in different kinds of learning environments, including the increased use of new information technology tools (p. 633). Kang (2001) suggests that since instructional-design theory, as it relates to educational technology, is still very much in the formative stages of development; faculty and instructional design experts need models to guide them as they formulate courses in a completely new domain of instruction. There are relatively few studies that describe a systematic process to assist faculty in designing technology enriched courses, whether they are taught in face-to-face, online, or hybrid. Reigeluth and Frick (1999) discuss the inherent weaknesses in quantitative research methods to improve instructional-design theories, "particularly in the early stages of development" and they underscore the value of formative evaluation and case-study research

methodologies to validate existing instructional-design theories or to generate new, up-to-date theories of learning.

Statement of the Problem

A frustration often conveyed by faculty in dealing with technology is the time and technical expertise required to understand computer-based technology and its relevance to improving the teaching and learning process, compounded by the problem of having little or no research data available to support the claims of its effectiveness (Dawes, 2001). Additionally, it is often the case that so-called "new and improved" technology enhancements appear on the scene before the full potential of the previous version is realized. Technical support and licensing issues add to the complexity of maintenance. Instructional technologies greatest challenge is not developing effective products, but developing effective products that people want to use. As Dalton (1989) writes, "although we can fill instructional gaps with fervor, we never seem to examine our solutions in light of the wants of the implementers" (p. 22).

In a recent report, based on a study conducted by the National Center for Postsecondary Improvement (NCPI, 2002), several issues were raised concerning the future direction of higher education. The researchers involved in the study called for higher education institutions to become "more effective learning organizations" (p. 12). The report goes on to question the impact that research has had on learning thus far and on the processes of discovering new ways to design and deliver new curricula and the design principles and methods that will generate the most effective approaches for using technology to improve learning. Technological advancements have made these

connections even more complex and there remains considerable uncertainty about how to invest in technology in ways that truly have an impact on teaching and learning.

There will always be novel opportunities and technologies, just as there will be questions about the integration of new media in education. As Clark and Mayer (2003) remind us, "What we have learned from all the media comparison research is that it's not the medium, but rather the instructional methods that cause learning." (p. 1).

This is a reflection on the enduring question of the relationship between the "newest media" and instructional methods. According to Clark and Mayer (2003) "new media" are still changing education. The advent of course management systems has allowed a much broader community of faculty to use images, graphics, sound, video, and computer simulations as instructional materials in their classroom. In addition, newer technologies and their applications spring up constantly. What are the "new media" of 2004? Some candidates are: virtual worlds, gaming environments, blogs, wikis, intelligent agents, iPods, MP3 files and players, institutional repositories, and so forth (Clark & Mayer, 2003).

> "Technologies and adopters change, but the questions endure. Can these information technologies, in fact, add value to learning" (Clark & Mayer, 2003, p. 1)?
>
> "Given the evolution of new media, how can educators determine what to use, when, and why" (Clark & Mayer, 2003, p. 1)?

Given our previous experiences with the rate of change; how should educators assess the effectiveness of new media using performance-based measures? This is the question that has eluded a comprehensive answer in the integration of educational technology into instruction in recent history. The Carnegie Mellon, the Eberly Center

for Teaching Excellence and the Office of Technology for Education have forged a close relationship to consult with faculty colleagues on effective teaching approaches based in learning theory, including the integration of technology into course design and classroom pedagogy. “One strategy we employ applies equally to any new approach in teaching, whether it employs new media or not. That strategy is to apply some of the best current knowledge from cognitive and learning sciences to assess proposed teaching innovation” (Clark & Mayer, 2003, p. 1).

Faculty colleagues were asked to think in a systematic way about any new pedagogical strategy, including the use of media. Couched in terms of use of “new media,” some of the fundamental questions we pose include:

1. What is the educational need, problem, or gap for which use of new media might potentially enhance learning?

2. Would the application of new media assess students’ prior knowledge and either provides the instructor with relevant information about students’ knowledge and skill level or provide help to students in acquiring the necessary pre-requisite knowledge and skills if their prior knowledge is weak? (Clement 1982, Minstrell 2000).

3. Would the use of new media enhance students’ organization of information given that organization determines retrieval and flexible use? (DiSessa 1982, Holyoak 1984).

4. Would the use of new media actively engage students in purposeful practice that promotes deeper learning so that students focus on underlying principles, theories, models, and processes, and not the superficial features of problems? (Craik and Lockhart 1972, NRC 1991, Ericsson 1990)

5. Would the application of new media provide frequent, timely, and constructive feedback, given that learning requires accurate information on one’s misconceptions, misunderstandings, and weaknesses? (Black and William 1998, Thorndike 1931).

6. Would the application of new media help learners develop the proficiency they need to acquire the skills of selective monitoring, evaluating, and adjusting their

learning strategies (some call these "metacognitive skills"), because these skills enhance learning and, without them, students will not continue to learn once they leave college? (Matlin 1989, Nelson 1992).

7. Would the use of new media adjust to students' individual differences given that students are increasingly diverse in their educational backgrounds and preferred methods of learning? (NRC 2000, Galotti 1999).

According to the effective teaching approaches based in learning from the Carnegie Mellon, each of these questions carries as its underlying presupposition a result from cognitive science. Collectively, we might call them *"cognitive desiderata" for new teaching strategies*. Knowledge is the lens through which we view all new knowledge, so understanding [and then addressing] students' misperceptions when they enter a course will aid learning. This principle is justified by many researchers, including the work of J.J. Clement (1982) and J. Minstrell (2000).

However "technocool" or visually attractive or absorbing a piece or collection of new media is, unless its instructional application plausibly justifies an answer of "yes" to the questions above, prima facie it is unlikely to affect educational outcomes. In contrast, if a proposed use warrants an answer of "yes" to one or more of the questions above, it stands a chance of making a difference. Of course, the ultimate test of whether any application of new media is instructionally significant is determined by empirical evaluation of its impact, an area that has too long been ignored in higher education in general (Ambrose & Smith, 2004, p. 2).

Purpose of the Study

The purpose of this study was to gather the perceptions of faculty in focus groups and individual interviews as they adopt new technology over time. My ACCESS, a Web based instructional writing tool was introduced to the faculty during the course of the

four-month study. Specifically, this study presents data that was collected, recorded, and analyzed for the purpose of describing the adoption process of how communications faculty at Florida Community College at Jacksonville adopt new technology over time. Several areas of research including adoption theory, developmental education, writing assessment, learning and motivation theories, cognitive and behavioral theories, information process, artificial intelligence, and instructional design were explored.

Significance of the Study

Despite the criticisms and the frustrations inherent in the use of technology in the teaching and learning process, many have pointed out that technology is no longer merely an optional enhancement to the traditional forms of teaching and learning, but has become a necessity in the high-tech world of the twenty-first century.

The decision to invest in technology is more than just a practical matter. It has also has economic implications. In the prevailing political climate that Boggs (2003) referred to, which is one marked by calls for greater accountability in higher education, in conjunction with significant cuts in public funding to colleges and universities, investments in new technologies have come under greater scrutiny, particularly since both the perceived and in many cases the real benefits of technology-based learning have been marginal at best. According to Green (2000), this is an unfortunate development because "electronic services and resources are core to the future of higher education…technology is now a component of the academic infrastructure…and deferred infrastructure investments can have long-term consequences".

There is a growing body of literature addressing the need for fundamental changes in developmental education, but there is a gap in the research literature with respect to descriptions of systematic practices that integrate what is known about effective teaching and learning strategies with developmental students with instructional technology. This study will add to the body of literature in the field of developmental education, learning communities, writing assessment, and instructional design, particularly in the area of technology-based learning over the Web, leading to information that will be beneficial to developmental faculty, instructional designers, and college administrators seeking to learn from the successes and challenges of others when initiating their own instructional design projects. Since a systematic approach to integrating technology with research-based teaching and learning strategies is an emerging field and the literature documenting such an approach is relatively sparse, this study will make an important contribution to the field.

Forbus and Feltovich (2001) argue that the impact of computers in education and the potential for revolutionary improvements in learning are only now beginning to be realized on a large scale. According to Forbus and Feltovich (2001) "educational systems in this country are now struggling to achieve this revolution, learning how to best use these technologies in their circumstances…and experimentation and refinements will continue for years to come" (p. 3).

The Need for Developmental Education at Community Colleges

Developmental education incorporates a wide range of interventions designed to assist under prepared students at community colleges. Developmental courses are found in more than 90% of the nation's community colleges and about 70% of our universities

(Boylan, Bonham, Claxton, & Bliss, 1992). According to the National Center for Education Statistics (NCES, 1996a) report, just under 30% of students entering American colleges need assistance in English, reading, or mathematics. We still have a large number of students who leave high school without the prerequisites to attend college. However, just because a student enters a university or college under prepared doesn't mean that they can not be successful given appropriate intervention once they attend college (Boylan, H., 1999). According to the data from the National Study of Developmental Education (Boylan & Bonham, 1992), those students scoring in the bottom half of the distribution and participating in developmental education courses at colleges, approximately 40% graduate with a baccalaureate degree, which is close to those students who graduate at the 45.5% national average for all students entering college (NCES, 1996b).

The characteristics of developmental students are usually measured by SAT and ACT tests or by assessment instruments at the institutions. Most students participating in developmental education state that their intention is to attain an associate or baccalaureate degree (Knopp, 1996). Typical developmental students are married (Boylan, Bonham, & Bliss, 1994b), work 35 or more hours a week (Knopp, 1996), and range in age from 16 to 60 years old (Boylan, Bonham, & Bliss, 1994b). Many are students who have trouble with reading, math or writing, or simply students that have been out of school for a long time and are returning to college. Developmental courses give them the opportunity to return to college and be successful. Good developmental education is student oriented, and delivered by well-trained people that value what they do. "Not anyone can teach developmental courses just because they have an advanced degree. It takes more than

subject knowledge; it takes knowledge of developmental students and how they learn" (Boylan, H., 1999, p. 6). Good developmental education also connects or interfaces with the rest of the college and the college curriculum. Some of the best developmental programs offer a seamless transition for students that enable them to transition from one level of content to the next level of content (Keimig, 1983; Korn, 1979; Roueche & Roueche, 1993). Good developmental programs should be evaluated and assessed using evaluation data not only to demonstrate what they do, but to constantly revise and improve programs (Boylan, Bliss, & Bonham, 1997).

Community colleges that are committed to leveling the playing field for student success should engage them in using instructional technology. "A high-tech, high-touch approach is required if we are able to have a chance to succeed in this effort" (McClenney, B., 2000, p. 1). Finding the proper mix of tutoring, technology, support-services, and classroom and lab experiences and establishing a safety net to have early engagement will be crucial. According to McClenney, the recommended ingredients that should be in place for developmental students include the following (p. 1):

- Institutional Commitment
- Cultural Sensitivity
- Entry-level Assessment
- Exit Competencies
- Appropriate Computer Technology
- Tutor/Mentors
- Priority of Professional Development of Faculty and Staff
- Accountability

Developmental programs that are the most successful include a blend of one-on-one tutoring, small group work, and computer assisted learning in formal and informal

class settings. Community colleges have the people in place with the desire to do the work and the services that developmental students need.

Assessing the Impact of Computer-Based Writing in Instruction

Writing and Assessment have become a volatile topic in current educational discourse, linking it to issues of accountability and standards. In *An Overview of Writing Assessment*, Willa Wolcott (1998) takes a lucid and rational approach to this controversial topic. Her even-handed treatment is especially valuable, given the importance of writing ability to assessment across disciplines. As Wolcott puts it, "because writing is intertwined with the learning process, the complexities of writing assessment serve as a microcosm of the assessment field in general" (Wolcott & Legg, 1998, p. 1). Wolcott refers to reader-response theory to explain why teachers (and, by implication, all test designers) need to think carefully about how they phrase their writing assignments. She writes, "Just as reader-response theorists have shown that interpretations of any given written passage can vary widely, so may the demands of a given prompt be interpreted differently, depending on the role of the person reading it" (Wolcott & Legg, 1998, p. 33).

Using information technology (IT) in instructional design in the classroom has the potential to change everything about teaching and learning in college, university, and student life. (Abeles, 1998; Dolence and Norris, 1995; Green and Gilbert, 1995, Gilbert, 1996, Kozma and Johnston, 1991). Engaging students with powerful pedagogical approaches, technology is supposed to enhance student learning productivity. This can be done by using synchronous classroom activities and providing students with engaging, self-paced and asynchronous learning opportunities that enable students to learn more

than they would otherwise at costs about the same as or below that of traditional classroom-based instruction (Black, 1997; Hannum, 1996, Johnston 1993; Twigg, 1995). Using the Internet, networks, and information technology, desktop computers have become ubiquitous, making accessible intellectual resources from around the world, not just from the host institution (Green, 1996).

Computer automated scoring has become an additional application of technology in assessment using computers. A variety of software programs that automatically rate writing ability is currently available. Essays or portfolios with prior ratings by faculty are submitted to allow calibration of the software. Empirical evidence suggests that computer automated scoring is very similar to scoring by human raters (Burstein et al., 1998; Shermis, Mzumara, Olson, & Harrington, 2001). These systems offer great labor savings, but the automated ratings do not supply the individualized narrative feedback so crucial to students seeking to improve their writing.

An increasing number of college students are using technology. While in the mid-1980's only abut 32% of students reported substantial progress in becoming familiar with computers and technology, by the late 1990's this percentage jumped to 60% (Kuh, Connolly & Vesper, 1998). According to the Higher Education Research Institute (1998), about 83% have used the Internet for research or homework by their senior year in high school or prior to matriculating in college.

Most of the studies examining the impact of IT on learning have been focused at the individual course level with "impressive" results (Hibbs, 1999). For example, computer use has been shown to enhance productive collaboration among students (Alavi, 1994) and encourages higher levels of student participation in and contributions

to class-related activities than in traditionally organized classrooms (Oblinger & Maruyama, 1996). According to Mallam and Wee (1998) communicating electronically:

> Achieves greater equality in participation because everybody gets to provide input to the discussion anonymously; the anonymity ensures that every idea is considered on its own merit, not on the basis of where it came from. Because the ideas are shared simultaneously rather than sequentially, there is a parallel processing of ideas and broad participation occurs efficiently. (p. 24)

Information Technology appears to be a very promising educational tool, and the vast majority of those writing in this area confidently predict that computing and other IT-related functions will revolutionize certain aspects of the teaching and learning process in the near term (Abeles, 1998; Dolence and Norris, 1995; Green and Gilbert, 1995; Hannum, 1996; Twigg, 1997, Kuh & Vesper, 2001).

Research Questions

This study deployed qualitative methodology using Interactive Qualitative Analysis (IQA) developed by Northcutt & McCoy at the University of Texas at Austin (Northcutt & McCoy, 2004). Qualitative research has the ability to capture in depth detail of the participants perceptions (Patton, 2002). The IQA methodology identifies elements and relationships through the participants' views and experiences. In this study, the perceptions of communications faculty using traditional pedagogy in writing instruction can be compared to those that integrate My ACCESS, the Web based instructional writing tool. While this study solicits in depth responses, it also explores how faculty see things and why they choose to adopt new technologies and/or why they do not. To that end, the following open-ended questions were used to frame the study for the purpose of data collection, description, and analysis.

1. What are faculty perceptions of adopting new technologies like My ACCESS as a tool to improve the writing of community college students?
2. What motivates faculty to adopt and integrate new technology into their courses and instructional design?
3. How can administrators support faculty in the adoption of new technology in instructional design?

Definition of Terms

Definitions are included in this paper to help guide and inform the reader. They are provided as a glossary of terms as represented by the current review of literature (TechWeb, 2004).

My ACCESS supports each step of the writing process and provides a powerful tool for faculty by helping them focus on instruction and learning. Faculty and students can access student writing portfolios online to monitor progress, provide additional feedback, and tailor instruction to address the students' specific needs. Students can write to several topics, receive feedback, edit their work, maintain a writing portfolio, and access writing instructional content. *Intellimetric*^{TM} is an intelligent scoring system used by My ACCESS that emulates the process carried out by human scorers. The system must be "trained" with a set of previously scored responses containing a "known score" and marker papers for each score point. These papers are used as a basis for the system to infer the rubric and the pooled judgments of the human scorers. *Artificial Intelligence* (AI) is the area of computer science focusing on creating machines that can engage in behaviors of logic that humans consider intelligent behavior. *Instructional Design* is the

systematic approach to the development of instructional programs which takes into account learning theory and research to ensure that the intended learning aims are realized. *Instructional Development* is the systematic approach to the development of instructional programs at an organization level. Instructional development is larger in scope than instructional design and takes into account the organization as a whole. *Needs Assessment* is a process utilized to determine what, if any, instruction should be designed. *Learner Analysis* is the examination of student characteristics that are relevant to the design of instruction including, but not limited to, age, academic ability, learning style, and motivation.

Teaching Methods are strategies utilized by instructors to deliver content and allow student interaction with content. *Learning Styles* refer to the cognitive, affective, and physiological factors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment. *Cognition* is the mental process of knowing, including aspects such as awareness, perception, reasoning, and judgment. *Developmental education* is community college courses prepared for (usually first-time) students that require additional development in writing, math, and reading. *Remedial student* is a social construct for students that are not prepared to take regular college courses upon entry to college. *Under Prepared Student is* a student that tests in developmental courses in math, reading, or language arts. These students are not yet prepared to enter regular college courses. *A Learning Community is* often called upon to develop skills and mindsets that embrace change. They scan the environment and anticipate change in the larger environment. *Instructional Technology* is the systemic and systematic application of strategies and techniques derived from behavior and

physical sciences concepts and other knowledge to the solution of instructional problems. *Goal* is the general and brief statement of intended outcome. *Objective* is the specific and detailed statement of intended outcome. *Norm-referenced Assessment* is an evaluation technique that is scored based on a bell-curve distribution produced by all students' scores. Standardized test are an example. *Criterion-referenced Assessment* is an evaluation strategy that is scored based on specific proficiency standards. *Formative Evaluation* is an assessment tool utilized to gain information that guides further instruction. *Summative Evaluation* is an assessment tool utilized to determine final learning outcomes and often to determine grades. *Chunking* is a process of grouping and organizing data into manageable chunks.

Curriculum is an organized set of formal education and/or training intentions. *Adaptive Instruction* is a type of instruction that supplies alternative teaching operations based on assessment of student readiness to profit from them. *Feedback* is information which can be used to restructure knowledge and support metacognitive regulation of ongoing performance. *Pedagogy* is the study of teaching. *Androgogy* is the study of teaching, specifically as it relates to adults.

Assumptions

For purposes of this research study the following assumptions were made by the researcher:

1. The twenty-one respondents interviewed were willing to answer the interview questions honestly using the interview protocol developed from the focus group.

2. The interview protocol accurately measured the perceptions of the twenty-one respondents interviewed.

Limitations

The findings of this research can be applied specifically to communications faculty involved in the study at Florida Community College at Jacksonville. Although there may be commonalities with other community colleges, the findings in this study are specific to adopting new technology at FCCJ and may be transferable to other contexts or circumstances. The study took place at Florida Community College at Jacksonville with communications faculty from four campuses. A faculty focus group, twenty-one individual interviews, two training sessions for My ACCESS software, and follow-up emails and telephone calls were conducted for twenty-one communications faculty over a four-month time period. The research design required the researcher to visit each faculty member at four different campuses during their scheduled office hours and to set-up scheduled individual interview sessions at non-teaching times for faculty. The training sessions required coordination of schedules for vendor trainers, faculty, a venue with sufficient technology access, and in some cases menu selections for the all-day training session which included breakfast and lunch. The generalizability of the study is applicable to the perceptions of other educators in adopting new technologies in instructional design.

Summary

Chapter one has outlined the background, problem statement, purpose, and significance of this study. Instructional and organizational change does not come easily in community colleges. "Applying the concepts of learning organizations to higher education will require examining values and embracing quantum change *incrementally*" (Morgan, 1998, p. 232).

Organizational Structure of the Dissertation

The dissertation contains five chapters. Chapter One provides an overview of the study, including the background, the problem statement, the research questions, the purpose of the study, definition of terms, and limitations of the study. Chapter Two provides a review of relevant literature, covering the historical development of educational and instructional technology, several classical and contemporary theories of instructional design, including the various subcategories of design such as adoption, learning and motivation theories, and instructional design theories that have emerged as a result of learning technologies. Chapter Three discusses the proposed research methodology for this study, the research deign, and gives an introduction and rationale for selecting the case, planned data collection methods, and strategies for strengthening the validity of the study. Chapter 4 reports the results of the study and Chapter 5 provides discussion and analysis.

Chapter 2

Literature Review

This chapter provides a review of the relevant literature. For the purposes of this study, the literature review focuses on three major categories, in addition to a number of related subcategories. The first major category of the literature review examines the use of technology with developmental students and transforming instruction using technology. This is followed by a review of the major theories of learning and motivation including behaviorism, cognitivism, and constructivism. However, neither term is considered definitive. The second category included in the literature review deals with technology-enhanced/enabled instructional design. This is commonly referred to in the literature as instructional technology or educational technology. Some researchers consider instructional technology as a subset of instructional design. Others use instructional technology to describe all aspects of instructional development and design. Within this category, a historical perspective of instructional technology is provided, in addition to emerging design theories influenced by changes in technology such as innovation decision process theory, rate of adoption theory, instructional technology diffusion theory and others. A review of the major theories of learning and motivation are also covered. The third major category covered in the literature review pertains to My ACCESS, a computer Web based instructional writing tool that electronically scores essays electronically. The review discusses how My ACCESS can be employed when attempting to bring about fundamental changes in the teaching and learning processes for students; particularly as it relates to facilitating a transition to a technology-based teaching and learning environment. One of the challenges encountered during the

literature review was the inconsistent and often contradictory use of the terminology and how the major concepts are defined. In cases where definitions have varied within different contexts, the relative meanings have been clarified.

Transforming Instruction using Technology with Developmental Students

The results of a national study suggest how technology could improve education for developmental students in community colleges. Much of the current pedagogy consists of the lecture method presenting information to students passively. "Developmental educators must break out of this presentational paradigm if they are to transform developmental education to help developmental students become more independent learners." (Brothen, T., 1998). Using the mastery learning model (Bloom, 1968) he suggests that the effects of technology can be beneficial to a selection of developmental courses.

A 1995 Annenberg/CPB Project funded a developmental faculty project at the General College of the University of Minnesota to analyze, identify, and disseminate more information about the best practices on teaching and learning of new technologies in seven developmental education areas: mathematics, writing, introductory psychology, speech communication, English as a second language (ESL), and learning resource centers. The project team sent a national survey to the National Association for Development Education and the League for Innovation in the Community Colleges asking the recipients to describe the technology that they were using and whether they thought that is was transforming the curriculum, or to administrators at some colleges asking that they identify faculty in their institutions currently using technology. Each was

asked to describe the technologies available to them at their college: overhead projection, video and audio equipment, computers and hand-held calculators, and accessibility to the World Wide Web for instruction.

In this particular study, there were some differences in the use of technology in different disciplines, however introductory psychology illustrates very well how technology could be used to improve the educational experience for developmental students. With approximately 1.5 million students taking this course each year, Brothen (1992, 1994) showed how computer-assisted introductory psychology course exercises could be used to assess developmental students' academic skills to assist them in becoming more independent learners. Although technology has been infused in and accompanying many text books, many faculty continue to use the tradition lecture method.

This domination derives not from lecture having been shown to be educationally superior to other methods: Discussion, for example, is clearly superior at fostering student retention of information, transfer of knowledge, problem solving, thinking ability, attitude change, and motivation (McKeachie, 1994, p. 54). Beins (1992) pointed out that, in many instances over the decades since 1910, psychologists have written that the lecture method is maintained because instructors (a) feel good for having made things "clear" in class, (b) like expressing themselves freely and hearing themselves talk, and (c) are reinforced by grateful students who appreciate nicely packaged information that relieves them from thinking. With such criticism, the method of introductory psychology has not changed.

Carol Twigg (1994a, 1994b, 1994c) described the traditional lecture method used in most classrooms as simply out of date. She requested a new national learning infrastructure in which students are required to learn more independently, work to test and enhance their learning with each other in cooperative learning communities that are free from the rigidity of time constraints used traditionally. Twigg holds out hope that educators will develop a much clearer vision of what higher education should accomplish in the field of technology and escape Skinner's (1984) pessimistic assessment of education as hopelessly teacher-centered with students expected to lock into the traditional lecture method used by most instructors. Computers offer a new way to move towards that vision.

Lepper and Guertner (1989) reviewed several meta-analyses that evaluated hundreds of individual and control group studies using computer-assisted learning. They reported moderate positive effects on student learning. These effects were even greater for "lower or remedial" (p. 175) students, those who are typically in developmental education. (Johnson & Periz, 1996) study sponsored by the League of Innovation in Community Colleges showed that computer assisted instruction to be effective in developmental students.

Considering these studies, the computer has not yet made an impact in higher education that affects the way people learn. Stoloffand Couch (1992) have published three directories of computer use in introductory psychology and Hornby and Anderson (1990) collected and reviewed 18 computer-assisted packages designed for use in introductory psychology courses. There have been no reports of using the computer-assisted packages to teach introductory psychology courses.

Ely (1996) has reported three trends in education. First, computers have become pervasive in educational institutions and more so at home and in the community. Second, there is increased advocacy for the use of educational technology and for teachers to become more technologically literate in creatively using it. Third, educational technology is increasingly perceived as a major vehicle in the movement toward educational reform. These trends as reported by Ely point to computers playing a vital role in higher education transformation.

To be effective in helping developmental students become more independent, self regulating, self-confident learners, technology should function at the level of the student. That is, it should stimulate behavior change and help students and instructors monitors that change. The best way for technology to have a transformational role in developmental education is for it to be effective in transforming students (Brothen, T., 1998). Bloom's (1968) mastery model suggests that students with academic deficiencies can be nearly as successful in mastery courses as well as qualified students. Keller's (1968) Personalized System of Instruction (PSI) has four distinguishing characteristics that have proven to be successful with developmental students (In Brothen, T., 1998):

1. There is emphasis on written material rather than lecture as the major teaching activity.

2. Students pace themselves through the course, finishing assignments as they are able.

3. The course is broken down into manageable units. Flexibility is a cornerstone of the method and is based on the assumption that students have many obligations and learn at varying rates.

4. Undergraduate proctors have been used to score tests to help students understand what their deficiencies are and how they might deal with them. (p. 5).

Kulik & Bangert-Drown (1990) and (Boham, 1990) recommend the use of PSI with developmental students. Bonham notes that PSI interventions are very beneficial in that 90% of developmental students move their average performance from the 50^{th} to the 70^{th} percentile on examinations. Instructors that adopt PSI models are likely to find ways to integrate instructional technology with teaching methods to be more effective in the classroom. Computers can deliver progress or feedback, or use assessment devices to students whenever they are ready to discover or master material. Using the computer, students can assess their progress and faculty can direct learning interventions to help them learn. Computers can assist in developmental education by allowing students to change their behavior. When designed into the curriculum, they can help students grow and take control of their learning as they continue to persist in attainment of their education.

Successful integration of technology in the classroom requires effective uses of learning theories and content-specific approaches to curriculum development (Adel & Brooks, 2003). According to Valdez et al (1999) the second phase of technology use in education can be characterized as a shift to a focus on learner-centered practices that dominated the learning environments of the 1990s. Students use technology to access large volumes of data to solve many complex problems. Learning has become student rather than teacher directed (Valdez et al, 1999, p. 11). In technology integration, the catalyst for accomplishment in the classroom remains with the teacher. Most recently, the newest challenge is to use technology to individualize instruction to help students meet certain standards; becoming student rather than teacher directed.

The International Society for Technology in Education (2000) offers a summary of the current challenges that must be addressed in order to maximize a technology integrated learning environment. They include:

- Visions with support and proactive leadership from the education system
- Educators skilled in the use of technology for learning
- Content standards and curriculum resources
- Student-centered approaches to learning
- Assessment of the effectiveness of technology for learning
- Technical assistance for maintaining and using technology resources
- Community partners who provide expertise, support, and real-life interactions
- Ongoing financial support for sustained technology use
- Policies and standards, supporting new learning environments (p. 4).

Schiffman (1995) calls on instructional designers to develop a solid foundation in learning theories. "Designers must be familiar with the theory on research and learning and must be able to apply them to actual practice" (p. 137). Before providing specific examples of instructional design systems, it may be helpful to first turn to a discussion of learning theory, given that many instructional systems design models are or should be developed on the basis of learning theories.

Theories of Learning

Newby, et al (2000) defines a learning theory as "an organized set of principles explaining how individuals learn; that is, how they acquire new abilities and/or knowledge" (p. 25). Learning theory is much more descriptive and generic in contrast to

instructional theory. Instructional theories should be prescriptive and context-specific and predicated upon the principles and assumptions of learning theory (Morrison, Ross, Kemp, 2004).

Phillips and Soltis (1998) trace the various ideas and concepts about learning all the way back to Plato. Plato believed that knowledge was present in human beings in some innate form at birth and that all future learning was impressed upon the mind through observation, and, in essence, was a revelation of knowledge that already resided within an individual's soul. In contrast to Plato's ideas on learning, John Locke's theory of learning proposed that an infant was born with a mind that essentially was a blank slate, but, none-the-less was pre-wired in some fashion to learn, simple and easy tasks at first, and then more complex and abstract learning as the individual grew and matured. The three major theories of learning that are discussed in this section: *Behaviorism*, *Cognitivism*, and *Constructivism* emerged, in a formal way, during the twentieth century. Additionally, Adult Learning Theory and Mastery Learning, as subsets of the three theories, are described in this section. Over the past century, Mayer (1999) discussed how the three dominant views of learning were developed as a result of research on learning: learning as a process of response strengthening, learning as knowledge acquisition, and learning as knowledge construction (p. 143).

Behaviorism

According to Mayer (1999), the response-strengthening theory, commonly referred to as behaviorism, posits that "learning occurs when a learner strengthens or weakens an association between a stimulus and response" (p. 143). Behaviorism, as a theory of learning, grew out of the field of psychology (Tiene & Ingram, 2001), but,

according to Mergel (1998), the basic concepts behind the theory of behaviorism can be found as far back as Aristotle's essay entitled "Memory" and in the writings of other philosophers over the centuries: Hobbs (1650), Hume (1740), Bain (1855), and Ebbinghause (1885). The theory of behaviorism focuses on the study of overt behavioral characteristics that can be observed and measured (Good & Brophy, 1990).

Critics of behaviorism challenge the notion that learning takes place only in response to external stimuli and that the internal cognitive processes of the individual learner are ignored by the behavioral theorists, primarily because behaviorists claim that such processes are not observable or measurable. Another criticism of behaviorism as a learning strategy is that it is based too heavily on passive learning and it is too focused on teachers delivering content knowledge in the form of facts and figures to students, who then attempt to learn the material in a rote, drill-and-practice manner, resulting in only surface-level learning of the material.

Cognitivism

Repetition and contiguity have been accepted as valid explanations for how some forms of learning take place. Cognitive theorists do not totally reject the fundamental premises of behaviorism. However, behaviorists are not concerned with how humans process and store information, as these phenomena cannot be observed, cognitive theorists place a great deal of emphasis on *how learning takes place* through the acquisition or reorganization of the cognitive structures. Learning, according to cognitive psychology, is much more concerned with what learners know and how they acquire knowledge than it is with behavioral responses to learning experiences (Jonassen, 2001).

Jean Piaget was considered to be one of the key theorists in the field of cognitive psychology. Many of his ideas have been linked to constructivism. The underlying principle of Piaget's theories is that the growth and development of cognitive processes occur when human beings form networks and systematic structures of knowledge as they interact with their environment. These structures become more complex and functional as the individual passes through the various stages of human development. Piaget's theories of learning and development have been compared to the workings of a computer program; the key difference lies in the fact that the computer program has an outside source entering the information that enables it to operate, whereas the human mind must self-encode information as it interacts with the environment (Phillips and Soltis, 1998).

Phillips and Soltis (1998) pointed out that Piaget's explanation for learning, which the authors described as learning through "wandering around" and "bumping into objects" does not explain how learners grasp subjects like science, mathematics, and history because the "bumping around" metaphor does not readily apply to the type of learning that takes place in these situations. Piaget observed that human beings are capable of processing and conceptualizing information according to different stages of development. Through the expansion of multimedia and interactive computer resources that are available on the Web today may, in fact, enable learners to interact with these disciplines in a much different fashion than ever thought possible just a few years ago.

The analogy between the human brain and the computer can be broken down when one examines how information is stored in a computer compared to the human brain. As Phillips and Soltis (1998) point out, computers file and sequence information in a linear fashion, whereas the human brain stores information in a complex system of

networks and linkages. One of the great mysteries of the workings of the brain that cognitive science has not explained is how information is cataloged in the brain and what kind of "system" is used to sort and retrieve information.

Constructivism

Bates (2000) describes the most likely scenario for the future of teaching and learning as student-led, and teacher facilitated. "Learners will take a constructivist approach to learning, seeking learning that meets their needs…knowledge will become more subjective and value laden, and less objective and rational-deductive" (p. 43). The paradigm shift to constructivism is viewed as a much more dramatic change than the move from behaviorism to cognitivism because both behaviorism and cognitivism are viewed as based on an objective ontology of knowledge (Mergel, 1998, Mayer, 1999). However, the distinctions between cognitivism and constructivism are not always clear and, in fact, the two theories share several similar characteristics. As an example, both use the analogy of the computer to compare the learning processes that take place within the human brain. This is why Piaget's theories of learning have been linked to both cognitive science and constructivism. Merrill summarized constructivism in the context of learning situation as based on knowledge that is constructed by the learner; learning as a personal interpretation of experience is active, collaborative, and situated in real-world contexts. The assessment of learning is an integral part of the learning context itself and does not take place in an isolated or artificial manner (p. 46).

One of America's most influential educational theorists, John Dewey, promoted the idea of experiential learning. Dewey believed that human beings learn by doing and "actively engaging… in a variety of experiences in the world" (Phillips and Soltis, 1998,

p. 39). Dewey advocated for learning environments that provided students with problems to solve that were meaningful and relevant to real-life situations. Blumenfeld's (1992) research reinforced Dewey's proposition that student motivation and learning is influenced by experiences that are marked by variety, diversity, challenge, control, and meaningfulness. Land and Hannafin (2000) proposed that technology enables the type of learning environments Dewey envisioned. Constructivist "favor rich, authentic learning, contexts over isolated, decontextualized knowledge and skill; student skill, goal directed inquiry over externally directed instruction" (p. 3).

Smerdon, Burkam, and Lee (1999) suggest that constructivism is more a philosophical approach to teaching than a prescription for teaching. Jonassen (2001) points out that objectivism, which is the foundation for both behaviorism and cognitivism, focuses on the object of our knowing, whereas constructivism is concerned with how we construct knowledge (p. 59). Jonnassen (cited in Mergel) describes the differences between constructivist and objectivist, as it relates to instructional design. An objective-based design has a pre-determined objective or outcome and develops a learning process to transfer these objectives into the learner's mind. Constructivism maintains that learning outcomes are not always predictable and cannot always be objectified. Therefore, instruction should foster, not direct, learning. Although the principles of constructivism have been around for many years, it is often referred to in the literature as a "new" theory of teaching. Smerdon, Burkam, and Lee (1999) attribute the "newness" of the theory to the transition underway to more student-centered instruction, in which the student is an active learner and the teacher is a facilitator or coach in the learning process (p. 8).

Jonassen and McAlleese (1993) propose a scaffolding approach to learning that integrates principles from the various learning theories. According to Jonassen and McAlleese, each stage of knowledge acquisition requires different types of learning. Initial phases are perhaps best served by a more behaviorist, objective-oriented approach and subsequent phases of learning, where more higher-order levels of thinking are desired, would best be achieved through a constructivist teaching and learning environment.

Lunenberg (1998) also points to technology as the key to creating learning environments based on a constructivist paradigm. Lunenberg defines constructivist theory in the educational context as students actively constructing their knowledge, rather than simply "absorbing ideas spoken to them by the teacher" (p. 76). Lunenburg views the hypertext, multimedia and interactive features of the World Wide Web and other computer technologies as the mediums for stimulating a constructivist learning environment. Lunenberg cites Brooks and Brooks' principles of constructivist pedagogy: (1) problems are posed of emerging relevance to learners; (2) structuring learning around "big ideas" or major concepts; (3) seeking out and valuing students' points of views; (4) adapting curriculum to address students' suppositions; and (5) evaluating student learning in the context of teaching (p. 79). Lunenberg advocates the use of technology as a means of organizing concepts to facilitate a constructivist learning environment. Mastery learning and has elements of all three of the major learning theories and is discussed in the next section.

Mastery Learning

DelPorto and Torgerson (online, 2004) define mastery learning as an educational theory that proposes that students will gain much deeper understandings of a subject, if they master one concept at a time, before moving on to the next concept. The underlying assumption is that students learn at different rates and the purpose of mastery learning is to provide regular and prompt evaluation of students' performance and then to allow sufficient time and a variety of experiences for each student to achieve the desired level of mastery for that particular topic of study.

According to Bloom (1976), mastery techniques of learning are effective at all levels of education and that research has shown that 80% of students reach expected levels of achievement for a given concept in a mastery learning environment, compared to only 20% in other forms of learning situations (p. 5). Other research studies have found mixed results in terms of the comparative outcomes of master learning techniques. According to one study mastery learning strategies seem to have the most significant effects on student learning when the teacher was rated average and little measurable impact when the teacher was judged to be excellent (Martinez & Martinez, 1999). Another study found that mastery learning approaches to teaching combined with other teaching and learning methods, such as enhancing cognitive entry behaviors, which had a more significant impact on learning outcomes compared to those situations where only one type of methodology was applied (Senemoglu & Fogelman, 1995). Other studies designed to measure student satisfaction with mastery learning techniques found that students considered as above average as well as students who saw themselves as average

or below average in academic achievement were favorable toward a mastery learning framework (Archer & Scevak, 1998).

Information Processing Theory

Information Processing theory involves processing, storing and retrieving information. (Atkinson & Shiffrin, 1968):

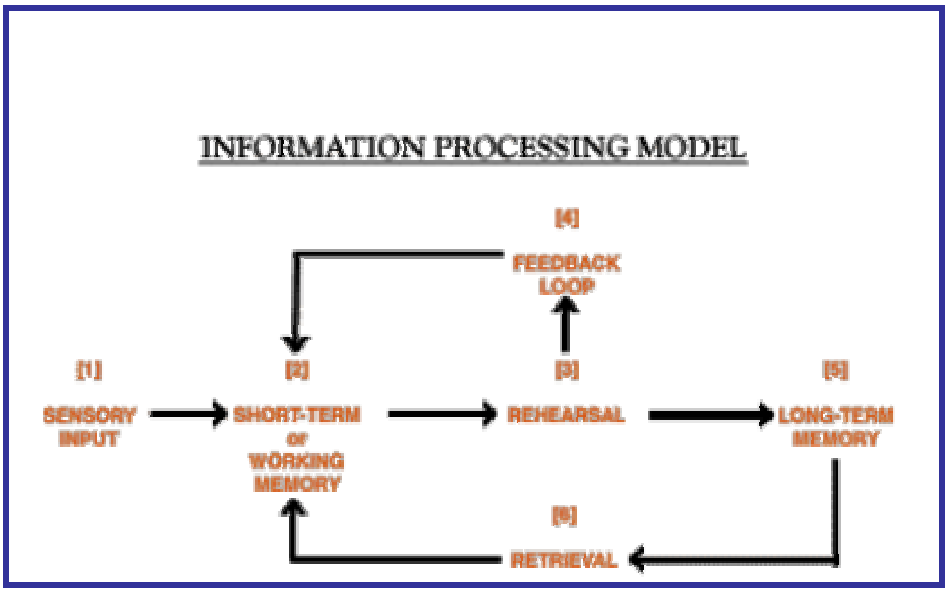
1) In information processing theory students are actively involved in processing, storing, and retrieving information.
2) Teaching and helping learners to develop information processing skills that can be applied systematically to master a subject matter. It involves cognitive structures that relate to the subject matter. Information processing also emphasizes cognitive structures that are built by the learner.

The three stage information Processing model was developed by Atkinson & Shiffrin. This is the most accepted model, with versions developed by Atkinson & Shiffrin, Kintsch, Klatsky, Loftus & Loftus. It includes:

1) Input or sensory registry,
2) Short-term memory,
3) Long-term memory.

Stage Model of Information Processing

One of the major issues in cognitive psychology is the study of memory. The dominant view is labeled the "stage theory" and is based on the work of Atkinson and Shiffrin (1968). IP MODEL (2004):



SOURCE: Retrieved, July 10, 2004, http://www.ohiou.edu/aac/tip/memory/information.htm

Artificial Intelligence Theory

Artificial Intelligence (AI) is the area of computer science focusing on creating machines that can engage in behaviors of logic that humans consider intelligent behavior. The ability to create intelligent machines has intrigued humans since ancient times, and today with the advent of the computer and 50 years of research into AI programming techniques, the dream of smart machines is becoming a reality. Researchers are creating systems which can mimic human thought, understand speech, beat the best human chess-player, and countless other feats never before possible.

Alan Mathison Turing was one of the great pioneers of the computer field. He inspired the now common terms of "The Turing Machine" and "Turing's Test." As a mathematician he applied the concept of the algorithm to digital computers. His research into the relationships between machines and nature created the field of artificial

intelligence. His intelligence and foresight made him one of the first to step into the information age.

Turing said, “In order to classify machines as thinking", it is necessary to define intelligence. To what degree does intelligence consist of, for example, solving complex problems, or making generalizations and relationships? And what about perception and comprehension? Research in the areas of learning, language, and sensory perception has aided scientists in building intelligent machines. One of the most challenging approaches facing experts is building systems that simulate the behavior of the human brain, made up of billions of neurons, and arguably the most complex matter in the universe. Perhaps the best way to gauge the intelligence of a machine is British computer scientist Alan Turing's test. Turing noted that a computer deserves to be called intelligent if it could deceive a human into believing that it was human (Turing, 2004).

Motivation Theory

Ledford and Sleeman (2002) describe motivation as a necessary condition for learning to take place. Keller and Burkman (1993) do not consider the design of an instructional message to be complete without factoring in its motivational appeal. Keller and Burkman define motivation as “that which determines the magnitude and direction of behavior” (p. 3). Keller and Burkman (1993) outline several assumptions regarding motivation and learning as it relates to instructional design: (1) motivation to learn is, in large part, a courseware designer’s (faculty and instructional designers) responsibility; (2) in the context of message design, learner motivation is a means, not an end; (3) designing instruction to be motivating can be a systematic process; (4) motivation must be

considered in all parts of an instructional message; and (5) motivational design interventions can be studied in terms of their effects on motivation independently of their effects on performance (p. 5). Blumenfeld (1992) describes the importance of variety, diversity, challenge, control and meaningfulness as important instructional components affecting motivation (p. 272).

Motivating Adult Learners

Wlodkowski (1999) identifies four major factors that influence adults' motivation to learn: (1) inclusion, (2) attitudes, (3) meaning, and (4) competence. Inclusion deals with course content that could diminish certain individuals or a group's desire to participate in the learning experience because it excludes the cultural and socioeconomic realities of certain individuals or groups. The attitudes adult learners have toward instructors, the subject, toward their own learning competencies, toward other adult students, and the expectations they have for success are significant factors in adult learning motivation. Adults also want to participate in learning experiences that are relevant, and varied in terms of the methods of delivery. In terms of competence, the assessments of performance that is motivating to adults are those that are connected to the adults' life circumstances, values, and frame of reference. Adults desire feedback that is prompt, frequent, and positive. Having discussed learning theories in the context of instructional design systems, the next section focuses on specific examples of instructional design systems.

Diffusion Theory and Instructional Technology

Instructional technologists, faced with a growing realization that innovative instructional products and practices have suffered from a lack of utilization, are beginning to turn to diffusion theory in an effort to increase the adoption of instructional technologies. A number of disciplines including marketing, agriculture, and information and communication technologies have use the theory of innovation diffusion to increase the adoption of innovative products and services. Diffusion theory can be defined as the process by which an innovation is adopted and gains acceptance by members of a certain community. A number of factors interact to influence the diffusion of an innovation. The four major factors that influence the diffusion process are:

1. The innovation itself
2. How information about the innovation is communicated
3. Time
4. The nature of the social system into which the innovation is being introduced (Rogers, 1995).

The study of diffusion theory is potentially valuable to the field of instructional technology for three reasons. First, most instructional technologist do not understand why their products are, or are not, adopted. In many cases, the underlying cause of instructional technology’s diffusion problem remains a mystery to the field. There appear to be as many reasons for instructional technology's lack of utilization as there are instructional technologists. Some instructional technologists blame instructors and an intrinsic resistance to change as the primary causes of instructional technology's diffusion problem, the including bureaucracy's resistance to change, and inadequate funding

(Schneberger and Jost, 1994). Second, instructional technology is inherently an innovation-based discipline. Many of the products produced by instructional technologists represent radical innovations in the form, organization, sequence, and delivery of instruction. An instructional technologist who understands the innovation process and theories of innovation diffusion will be more fully prepared to work effectively with clients and potential adopters (Schiffman, 1991). Third, the study of diffusion theory could lead to the development of a systematic, prescriptive model of adoption and diffusion. Instructional technologists have long used systematic models to guide the process of instructional development (ID). These systematic ID models have resulted in the design and development of effective and pedagogically sound innovations. The most important fact to consider in discussing diffusion theory is that it is not one well-defined, unified, and comprehensive theory. A large number of theories, from a wide variety of disciplines, each focusing on a different element of the innovation process, combine to create a meta-theory of diffusion.

The most likely reason why there is not a unified theory of diffusion is that the study of innovation diffusion is a fairly recent field. Rogers (1995) points out that a 1943 study by Ryan and Gross at Iowa State University provided the genesis of modern diffusion research. The Ryan and Gross (1943) study, from the field of rural sociology, used interviews with adopters of an innovation to examine a number of factors related to adoption. The interview-based methodology used in the Ryan and Gross study have remained the predominant diffusion research methodology ever since (Rogers, 1995). A number of researchers from rural sociology (Fliegel & Kelvin, 1962) and other

disciplines (Weinstein, 1986) have built on the Ryan and Gross' work to conduct studies and develop theories related to the diffusion of innovations.

The researcher who has done the most to synthesize all of the most significant findings and compelling theories related to diffusion is Everett M. Rogers. Rogers' book *Diffusion of Innovations*, first published in 1960, and now in its fourth edition *is the closest any researcher has come to presenting a unified theory of diffusion* (Rogers, 1995). Four of the theories discussed by Rogers are among the most widely-used theories of diffusion: Innovation Decision Process; Individual Innovativeness; Rate of Adoption; and Perceived Attributes.

Innovation Decision Process Theory

Rogers (1995) suggests that diffusion is a process that occurs over time and can be seen as having five distinct stages. The stages in the process are Knowledge, Persuasion, Decision, Implementation, and Confirmation. According to this theory, potential adopters of an innovation must learn about the innovation, be persuaded as to the merits of the innovation, decide to adopt, implement the innovation, and confirm (reaffirm or reject) the decision to adopt the innovation.

Individual Innovativeness Theory

Rogers (1995) states individuals who are predisposed to being innovative will adopt an innovation earlier than those who are less predisposed. Figure 1 shows the bell shaped distribution of Individual Innovativeness and the percentage of *potential adapters theorized to fall into each category*. On one extreme of the distribution are the

Innovators. Innovators are the risk takers and pioneers who adopt an innovation very early in the diffusion process. On the other extreme are the Laggards who resist adopting an innovation until rather late in the diffusion process, if ever. See Figure 1 below:

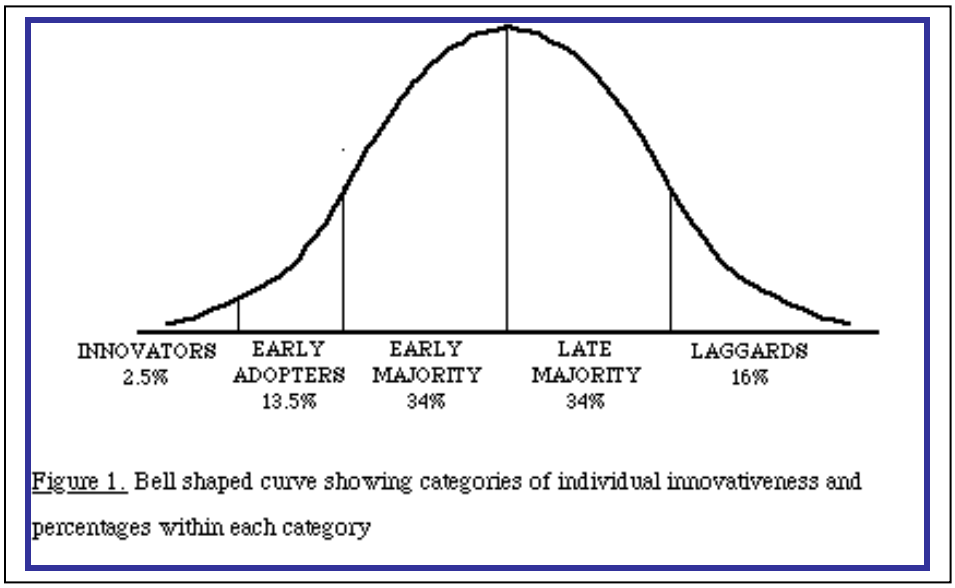


Figure 1. Bell shaped curve showing categories of individual innovativeness and percentages within each category

SOURCE: INNOV (2004). Individual Innovativeness. Diffusion Theory and Instructional Technology, Retrieved July 19, 2004 http://www.gsu.edu/~wwwitr/docs/diffusion/.

Rate of Adoption Theory

The third widely-used diffusion theory discussed by Rogers (1995) is the theory of Rate of Adoption. Rate of Adoption theories state that innovations are diffused over time in a pattern that resembles an S-shaped curve. Rate of Adoption theorizes that an innovation goes through a period of slow, gradual growth before experiencing a period of relatively dramatic and rapid growth. An example of how rate of adoption might typically be represented by an s-curve is shown in Figure 2. The theory also states that following

the period of rapid growth, the innovation's rate of adoption will gradually stabilize and eventually decline.

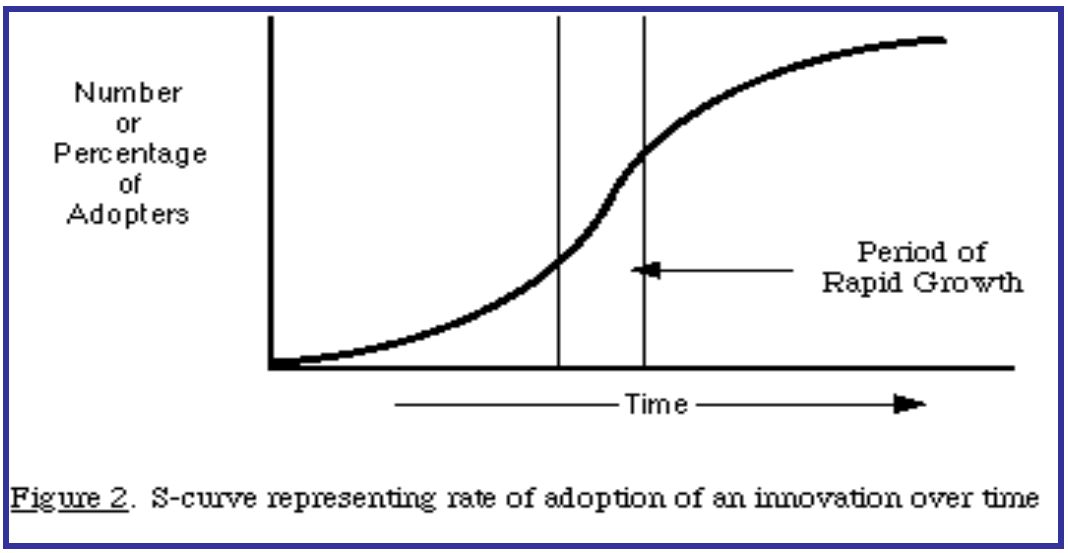


Figure 2. S-curve representing rate of adoption of an innovation over time

SOURCE: ROA (2004) Rate of Adoption Theory, Retrieved July 19, 2004, http://www.gsu.edu/~wwwitr/docs/diffusion/.

Instructional Technology Diffusion Theory

Macro Diffusion Theory

Applications of diffusion theory to instructional technology can be grouped into two major, categories with distinctly separate goals. The first major category focuses on the reform and restructuring of educational institutions. The goal of this category of IT diffusion research is to develop theories of organizational change, most commonly school change, in which technology plays a major role. Macro diffusion theories, often referred to as systemic change theories, typically involve the adoption a wide range of innovative technologies and practices. Because of their broad scope, systemic change theories can be thought of as macro-level IT diffusion theories.

Micro Diffusion Theory

The second major category of IT diffusion research focuses on increasing the adoption and utilization of specific instructional products (Tessmer, 1990). The goal of this category of research is to develop theories of technology adoption that will lead to a more widespread use of instructional innovations. Theories in this category are not concerned with large scale, systemic change, but focus on the adoption of a specific innovation by a specific set of potential adopters. Because of their focus on specific innovations and specifics environments, these theories are, in effect, micro-level IT diffusion theories (Burkman, 1987).

Two major categories of IT-related diffusion research offered by (Chandler, 1995) include: Macro, or Systemic Change Theories, and Micro, or Product Utilization Theories. They can each be divided into two subcategories. The subcategories represent the two predominant philosophies of technology and technological change: Technological Determinism and Technological Instrumentalism. The next section includes a brief overview of the two predominant philosophies.

Determinist versus Instrumentalist

From a theoretical standpoint, views of technology range on a continuum from technological determinism to technological instrumentalism. Autonomy and continuity are the key issues in the philosophical debate between determinists and instrumentalists. Technological determinists view technology as an autonomous force, beyond direct human control, and see technology as the prime cause of social change (Chandler, 1995). Determinists view the expansion of technology as discontinuous. They see technological

growth not as a gradual, evolutionary process, but as a series of revolutionary leaps forward. Figure 3 below, shows the prevailing views of technology and their relationships.

Philosophy of Technology	Philosophical Premise	Notable Advocates	Examples from IT
Utopian Determinism	Technology is an inevitable, autonomous force that will lead to prosperity and be the salvation of humanity	Karl Marx Marshall McLuhan Alvin Toffler Technology Zealots	RDD Paradigm ID Models Systemic Change
Dystopian Determinism	Technology is an inevitable, autonomous force that is morally corrupt and will lead to the destruction of humanity	Jacques Ellul George Orwell Unabomber Luddite Movement	Change Resistors
Instrumentalism	Technology is under human control and its use can lead to beneficial or disastrous consequences	Daniel Chandler Paul Levinson Donald MacKenzie	Ernest Burkman

Figure 3. The three prevailing views of technology and their relationships to instructional technology.

SOURCE: POT (2004). Philosophy of Technology. Diffusion Theory and Instructional Technology, Retrieved July 19, 2004, http://www.gsu.edu/~wwwitr/docs/diffusion/

Opposed to the determinist philosophers are the instrumentalist philosophers. Human control over technology is the issue that most dramatically divides instrumental philosophers and determinist philosophers. Technological instrumentalists, as their name may imply, view technology as a tool. The instrumentalists often cite the knife as an example of their philosophy (Levinson, 1996). A knife is a tool and can be used for either good or evil, depending upon the intentions of the person employing the tool. Extrapolating from that simple example, instrumentalists believe that all technology is a

tool, largely under human control, that can be used for either positive or negative purposes. While determinists see technology as the most powerful force for change, instrumentalists see social conditions and human aspiration as the primary causes of change. The other major difference between the two philosophies is that instrumentalists view the growth of technology as an evolutionary process, not as a series of revolutions or technological leaps (Levinson, 1996). They see technological growth as the ultimate culmination of a long history of slow, gradual expansion. See Figure 4 below.

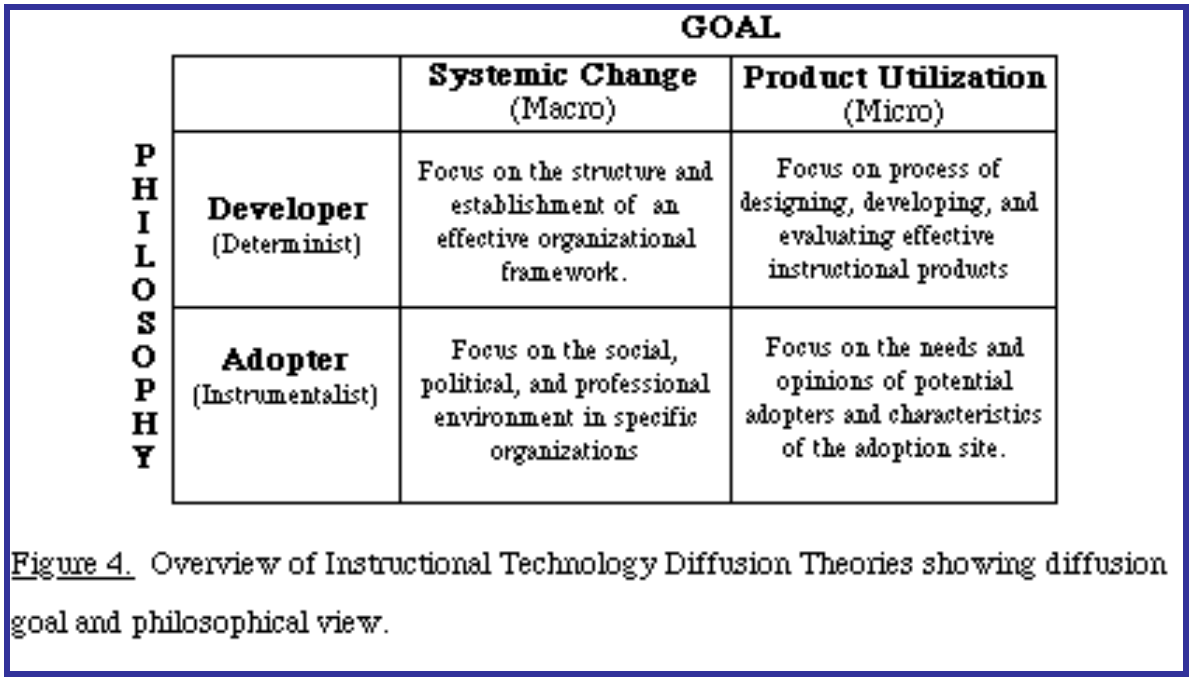


Figure 4. Overview of Instructional Technology Diffusion Theories showing diffusion goal and philosophical view.

SOURCE: DT (2004). Determinist Theories. Diffusion Theory and Instructional Technology, Retrieved July 19, 2004, http://www.gsu.edu/~wwwitr/docs/diffusion/

The result is a breakdown of IT-related diffusion theory into four areas. The areas are shown in Figure 4. Two additional subcategories; Developer Based and Adopter Based are discussed in further detail.

Developer Based (Determinist) Theory

The goal of developer based theory is to increase diffusion by maximizing the efficiency, effectiveness and elegance of an innovation. The developer, or architect, of superior technology is seen as the primary force for change. The underlying assumption of developer based theories is deterministic in its belief that superior technological products and systems will, by virtue of their superiority alone, replace inferior products and systems. Developer based theories of diffusion see change as following directly from a technological revolution.

Developer based theories in instructional technology assume that the best way to bring about educational change is to create a system or product that is significantly superior to existing products or systems. Potential adopters are viewed as being predisposed to adopt innovations that are quantifiably superior. Top down school reform efforts such as the Goals 2000 initiative (Mehlinger, 1995) are excellent examples of developer based diffusion theories. These top down reform efforts seek to diffuse educational change by proposing educational systems that are superior to existing systems. By specifying goals, organizational structures, managerial philosophies, instructional products, and fiscal strategies that have been proven to be, or at are least theorized to be, superior to existing practice, top down school reformers are counting on technological superiority to bring about change.

Instructional development (ID) models are another example of developer based theories of diffusion. Diffusion is not an element overtly described in a typical ID model (Andrews and Goodson, 1991), but the adoption of an innovation does have an implied

place in the ID process. Diffusion through technological superiority is the implicit goal of the process. Andrews and Goodson (1991) list four purposes of systematic instructional design: 1) Improved learning; 2) improved management (of the ID process); 3) improve evaluation (of products); and 4) theory building. Three of the four purposes center on the creation of technologically superior products. The instructional development process assumes that technological superiority is a sufficient condition that will lead directly to the adoption and diffusion of innovative products and practices.

While there can be ethical debate as to whether the same process used to develop the atomic bomb should be used to develop human minds, there can be little argument that the continuing refinement and wider use of Burkman's research, development and diffusion (RDD) paradigm have resulted in the creation of instructional products that are pedagogically sound and technically advanced (Burkman, 1987). Instructional technologies greatest challenge is not developing effective products, but developing effective products that people want to use. As Dalton (1989) writes, "although we can fill instructional gaps with fervor, we never seem to examine our solutions in light of the wants of the implementers" (p. 22).

Adopter Based (Instrumentalist) Theory

Adopter based theories focus on the human and interpersonal aspects of innovation diffusion. Adopter based theories are inherently instrumental in philosophy because they view the end user -- the individual who will ultimately implement the innovation in a practical setting, as the primary force for change. These theories reject the

assumption that superior products and practices will automatically be attractive to potential adopters.

Segal (1994) states the importance of adopter based theories when he writes "all structures and machines, primitive or sophisticated, exist in a social context and, unless designed for the sake of design itself, serve a social function" (p. 2). Adopter based theories seek to understand the social context in which the innovation will be used. Tenner (1996) describes the concept of revenge effects which is central to many adopter based theories. Revenge effects occur when "new structures, devices, and organisms react with real people in real situations in ways we could not foresee" (p. 9). Predicting and account for probable revenge effects caused by an innovation is a defining component of many adopter based diffusion theories.

Adopter based theorists (Tessmer, 1990) argued that a variety of factors, most unrelated to technical superiority, influence the decision to adopt or reject an innovation. Examples of adopter based theories can be found in both the Macro and Micro categories of IT diffusion research. Ernest Burkman (1987) was the first major author in the field to suggest a Micro (Product Utilization) theory based on an instrumentalist view of instructional technology. Burkman's theory of a user-oriented instructional development (UOID) rejects the idea that technological superiority is a sufficient condition for the adoption of an instructional product. In UOID, the opinions, needs, and perceptions of the potential adopters are seen as the primary forces that influence adoption.

Burkman's User Oriented Instructional Development process consists of 5 steps:

1. Identify the potential adopter
2. Measure relevant potential adopter perceptions
3. Design and develop a user-friendly product

4. Inform the potential adopter (of the product's user-friendliness)
5. Provide Post Adoption Support

Diffusion theory has been incorporated in the field of instructional technology in a number of ways, both subtle and overt. Diffusion theories can have as their goal the total restructuring of an entire instructional system or the adoption of a specific instructional product using either determinist or instrumental philosophy.

The field of instructional technology is a broad and diverse field. Instructional technologists routinely incorporate theories from communication, cognitive psychology, management, computer science, behavioral psychology and many other fields into the development of instructional products and systems. Instructional technologists have begun to incorporate the theories of innovation diffusion. This has increased the awareness of diffusion's importance and expanded the use of diffusion theories which have a great benefit to instructional technology.

Superior technology does not always steam roll inferior technology, as the determinists believe. Nor does a superior technology explode onto the scene in a glorious, perfect form -- it creeps along in fits and starts. Technology's advance may be inevitable, but it is gradual. Instructional technologists should, therefore, look to the potential adopters to show us ways to gradually introduce our innovations into their societies.

Of course, while a less determinist philosophy would be beneficial to instructional technology, a totally instrumentalist philosophy would be disastrous. Turning out technically inferior and pedagogically weak products that people want to use is not the answer. Every technologist is inherently a determinist. There is no danger in being driven to improve society by improving instructional technology. The danger is to ignore the

society we are attempting to improve. Instructional design should be based on established theories of learning from cognitive psychology.

Instructional Design Systems Models

It is not anticipated that the project at Florida Community College, which serves as the topic of this study, will necessarily follow any one of the models discussed in this section, but these models will provide a useful framework for identifying and analyzing what components of these models, and perhaps others that may surface during the course of the research, that are not currently referred to in this literature review. The models discussed in this section were selected based on the general principles of instructional design features contained within the models.

1. The instructional design process is not complete without specific procedures for *assessment* of what students have learned. Assessment procedures should be based on *criterion-referenced* measurement of learning outcomes.

2. The design of lessons and courses leads to the design of entire instructional systems with the aim of achieving comprehensive educational goals.

Salisbury (1996) identifies systems thinking, systems design, quality science, change management, and instructional technology as the five technologies that will bring about revolutionary change to education. These five forces will need to be harnessed and effectively used to meet the increasing demands on the educational systems in the United States. Salisbury believes that these changes have the potential to provide a greater number of students with the opportunity to master reading, writing, mathematics, history and a host of other basic subjects at an accelerated pace, but not in the traditional lecture format of teaching, but through high tech learning resources and “effective strategies for

developing, reinforcing, and assessing basic and advanced skills (p. 147). The role of one of these five forces of change – instructional technology – will be the focus of the next section.

Instructional Technology

Although there as been much discussion and debate pertaining to the role of technology in education, the most recent focus has been on a newer, more powerful intervention – the microcomputer, which has become the link between technology and education. Both have enjoyed a much longer history. Noble (1977) attributes the introduction of the term "technology" into mainstream usage to Jacob Bigelow, a physician who lectured at Harvard in 1829.

> Technology…under this title is attempted to include an account…of the principles, processes, and nomenclatures of the more conspicuous arts, particularly those which involve applications of science, and which may be considered useful, by promoting the benefit of society, together with emolument of those who pursue them (Bigelow, quoted in Noble, 1977, pp. 3-4).

Technology has been defined broadly, as the design and use of man-machine systems (Ely, 1966, p. 1). According to Januszewski (2001), the Association of Educational Communications and Technology (AECT) have changed the meaning of educational technology over time. Both the political and philosophical dimensions of the evolution of educational technology have been described by the AECT Since the organization first defined the term in 1972 the AECT has changed the definition of educational technology on two separate occasions. The forerunner to AECT provided a working definition in 1963 that will be discussed later in the report. Januszewski (2001)

points out that “the very existence of three definitions is evidence of disagreement about ideas of technology (p. 17). Januszewski describes audiovisual (AV) education as the “third major influence” on the field of educational technology (p. 12). The first two were engineering and science. According to Januszewski (2001), AV equipment, once viewed as primarily teaching aids to enrich instruction within the confines of the classroom, became an educational movement, in which the focus was shifted from AV as mere hardware and equipment to a “systematic approach to improving instruction” (p. 13). An influential textbook written by Charles F. Hoban, Jr. and published in 1937 was instrumental in raising the profile of educational technology from a mere “machine-based” concept to an entire systems approach to providing instruction.

> A visual aid is any picture, model, object, or device which provides concrete visual experience to the learner for the purpose of (1) introducing, building up, enriching, or clarifying abstract concepts, (2) developing desirable attitudes, and (3) stimulating further activity on the part of the learner…Visual aids are classified according to general types along a scale of concreteness and abstraction (Hoban quoted in Januszewski, 2001, p. 12).

The convergence of science, engineering, and audiovisual education are the unique combination of factors that led to the first formal definition of educational technology in 1963. The educational technology concept was later developed by the Department of Audiovisual Instruction (Januszewski, 2001).

Saettler (1990) addresses the confusion about educational technology in more direct terms:

> With the rise of new information technologies, there has been widespread confusion concerning their meaning and function within the instructional process. Many people, including some educators, have equated new information technologies with educational technology and have used the terms

> interchangeably. New information technologies refers to electronic media that may or may not be used for instructional purposes, while educational technology is concerned with the total process of instructional design and learning (p. 453).

Communication and Technology

> Audiovisual communications is that branch of educational theory and practice primarily concerned with the design and use of messages which control the learning process. It undertakes: (a) the study of the unique and relative strengths and weaknesses of both pictorial and nonrepresentational messages which may be employed in the learning process for any purpose…the undertakings include the planning, production, selection, management, and utilization of both components and entire instructional systems (Ely, 1963 cited in Januszewski, p. 18).

A more complex and ambiguous definition of educational technology was produced in 1977 by AECT which was later simplified in 1994. An effort was also made in the revised definition to distinguish instructional technology and educational technology, although in many instances these terms are used interchangeably. Educational technology, however, typically represents the broader aspects of the educational enterprise and includes administration, and other "non-instructional" related functions. Instructional technology, on the other hand, is concerned with "the function of technology in education" (Januszewski, p. 101). Under the new language educational technology was more narrowly defined by AECT and referred to as instructional technology: "Instructional technology is the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning (Seels and Richey, quoted in Januszewski, p. 103). It was not until shortly after World War II, the word "technology" moved from a process-orientation definition to the popular notion of state-of-the-art equipment, such as today's computers and Internet related

technologies. This broader definition created tension between those who view educational or instructional technology in strictly "stand alone" technical terms and those who view it as encompassing an entire instructional process. Januszewski suggests that educational technology is a "worldview" of education, in which an emphasis is placed on designing instruction that incorporates scientific and engineering principles with audiovisual media to solve educational problems.

> Gentry (1995) summarized the state of educational technology as "while educational technology is a dynamic emerging field, it is, sadly, still seeking definition. In the relatively short period of its evolution, the field of educational technology has taken on a surprisingly wide-range of meanings" (p. 1).

Computers and Education

Saettler (1990) has traced the history of computers in education to the 1960s with the introduction of computer-assisted instruction (CAI). By the 1970s, it was apparent that CAI had not significantly changed education, as been hoped for in the previous decade. These dashed expectations, however, did not prevent a wave of new systems from being developed, such as PLATO (Programmed Logic for Automated Teaching Operations) project at the University of Illinois, and TICCIT (Time-Shared Interactive Computer-Controlled Information Television) project at Brigham Young University (p. 456). PLATO and TICCIT did not significantly improve student achievement. Such was the case with the previous generation of CAI systems.

A resurgence of enthusiasm in education for the use of the computers in education occurred in the late 1970s, with the advent of the microcomputer, and an expanding consumer market for them. Saettler (1990) reported that by the early 1980s, school

systems began to invest significant resources in microcomputers for classroom use, but, despite the fact that by 1988 it was estimated that there were over three million computers in American elementary and secondary schools, research showed that the average user got to use the computer less than thirty minutes a week. The drill-and-practice format was the predominant use of the computer in the classroom during this period. According to Saettler, the computer literature from that time showed that the computer was viewed as an extension or "add on" to the traditional goals of education.

The novelty of CAI seemed to wear off and the expectation that teachers would use computer technology to produce their own software for classroom instruction was diminished by the reality that most teachers "lacked the time, the energy, or the expertise to engage in such a task" (Saettler, 1990, p. 457). In addition to these constraints, most faculty did not have the training or the understanding of how to use computers to enhance teaching and learning. Another factor that contributed to the computer, once again, not resulting in significant improvements in the teaching and learning process was that many teachers lost interest in the drill-and-practice software that dominated the educational market at that time, as it became apparent that most of the software did not exploit the capabilities of the computer to enhance teaching and learning.

Despite the criticisms of computers in education and the lack of significant change as a result of the huge investments in computer systems in the late 1980's, educators seemed oblivious to the need to question the return on investment. Sloan (cited in Saettler, 1990) noted:

> American educators have made no concerted effort to ask at what level, for what purposes, and in what ways the computer is educationally appropriate and

> inappropriate, in what ways and to whom we can count on its being beneficial or harmful. The overall picture has been one, instead of educators vying to outdo one another in thinking of new ways to use the computer in all manners and at every level of education possible. Professional responsibility demands more (Sloan, in Saettler, 1990, p. 458).

The expansion of electronically delivered courses in recent years seems to be an indication that computers and the Internet may be finally starting to fundamentally change the face of education in a way that has long been hoped for since the emergence of the computer in the 1960s. However, as Twigg (2002) points out, online courses, which perhaps represent the most overt signs of how education is changing as a result of technology, are organized in a very similar fashion as their campus counterparts. Twigg (2002) calls for pacesetters to design ways to create online learning environments that appeal to a broad array of learning styles and enable students to interact with learning materials that move them beyond merely reading text. Twigg (2002) wrote that the capacities of the computer and the development of new software provide the opportunity for faculty to design "built-in continuous assessment. Rather than the traditional periodic assessment model, such as midterm and final examinations, assessments should become a learning experience for students rather than "an all-or-nothing" performance standard. The process of spacing quizzes, either graded or non-graded, throughout the semester is likely to lead to better overall understanding and retention of course material. According to Twigg, the advantages of continuous assessment include "an increase in time that students spend studying, a higher level of familiarity with tested material and comfort with the testing process, immediate feedback, and the ability to see the result of effort toward achievement" (p. 3).

Instructional Technology Design Theories

Merrill (1999) focused on instructional design theory, also known as Instructional Transaction Theory (ITT). Merrill defines the value of ITT in instructional design systems as:

- Efficient learning process (via carefully defined learning strategies).
- Efficient instructional design process through automation
- Efficient simulation design through automation
- Combining simulations with tutorial instruction
- The power of exploration with guidance
- Adapting instruction to individual students in real time as their needs change during learning (p. 398)

Integrating and Sustaining Instructional Technology Across the College

The successful growth of instructional technology integration depends on several external factors that support the organizational environment such as: Funding the technology infrastructure, universal student access to computers, reliable networks, and multiple on-going opportunities for training faculty and staff. In order to continue to integrate and sustain instructional technology across the college, there must be commitment from the institutional administration, from those responsible for the campus computing resources, and the faculty. The commitment to use technology in instruction must be consistent, reliable, and long-lasting. Identifying early adopters and mobilizing

them around the emerging leaders of instructional technology will generate enthusiasm and movement throughout the organization (Ayers C. & Doherty, 2003).

Technology integration into instructional design can be a slow process. It should not be forced, but systematically integrated with a calendar of events that are well publicized with subtle reminders. Faculty can be resentful to change if they feel they are being bombarded with too many initiatives. Integrating technology into teaching and learning is a time-consuming process and does take a substantial level of commitment, encouragement, and support for full system implementation.

The infrastructure most needed to support the information technology era is financial, social, and political, not technical. Financial infrastructure is the institutional commitment to understand the economics of technology advancement, and develop financial strategies to fund technology adequately. Social infrastructure is the critical mass of faculty, staff, and students who are willing to accept technological advancements and work for change. Political infrastructure is the collective resolution of senior administrators, trustees, and legislators to support information technology as a strategic imperative for the campus (Oberlin, J. L., 1996, pp. 10-17).

In colleges that have less technology resources, integration could take longer. Providing faculty technical assistance and follow-up encourages them to move the technology integration continuum a little farther each day.

Faculty development efforts must be considered an institutional resource that should be applied consistently to ensure quality across the curriculum. The Center for Student Success (CSS) conducted a study to determine the extent to which faculty development services in information technology could be linked to student outcomes. This research provided evaluative data about the @ONE project and best practices for faculty development in higher education. Many of these practices are derived from the literature review and ethnographic and survey studies from the @ONE project (CSS, 2002).

1. *Training modules should blend pedagogical principles and technologies features*. Training modules should be linked as much as possible to actual practical situations and should focus on pedagogical innovation and student learning.

2. *If possible, training should try to keep the technology transparent.* The training should allow faculty to pursue pedagogical and content goals without being hindered by prohibitive technology learning curves.

3. *Training should be reinforced by follow-up* to ensure that instructors are integrating what they learned into their teaching and curricula. Local faculty support development efforts are best positioned to provide continuous technical support and respond to questions and concerns.

4. *Learning from peers has been found to be highly effective in the academic environment.* Showcasing examples of successful integration of instructional technologies by other instructors, particularly those in the same discipline, should be a training approach pursued on a systematic basis.

5. *As in the delivery of instruction for students, faculty development in instructional technology should be just-in-time and on-demand* including virtual faculty development, electronic communities, and self-paced faculty development. The just-in-time and on-demand requirements assume constant monitoring of faculty training needs.

6. *Training offered through summer institutes should cover a range of content such that faculty can have choices for intensive training*. This work should be

in the form of project-based work directly related to the faculty's instructional responsibilities.

7. *Training itself cannot accomplish much unless campuses provide an enabling technological* environment that emphasizes instructional technology integration throughout the curricula (CSS, 2002).

Drucker & Hinds suggests that it is the new forms of technology themselves which demand that organizations restructure and adopt new ways of working to survive in today's marketplace (Drucker, 1988; Hinds & Kiesler, 1995). The emergence of the post-bureaucratic forms of organization called *the knowledge-creating organization* (Nonaka & Takeuchi, 1995) has been closely tied to the developments of computer-based technologies. This new organization enables employees to make better informed decisions to respond more quickly to environmental changes and to realize innovative ideas. One of the values of technology in the post-bureaucratic concept is the integration of valued aspects of both individualism and connectivity throughout an organization. The proliferation of new technologies has also precipitated the need for a more integrated approach to understanding organizational change. Managers need a much more integrative framework for understanding how leadership, technology, and academic culture influence the design and implementation of a flexible, more adaptive organization for the knowledge based era (Johnson, M., Hanna D.E., & Olcott, D., 2003).

There is considerable work that needs to be done in terms of the use of technology for instructional purposes and the solidification of the technical and organizational infrastructure. The challenge is continuing faculty innovation and control in the classroom while establishing campus-based standards for technology use. Attention should be given to individual faculty needs and voices, while simultaneously planning

and implementing instructional technology that is based on students' needs and outcomes.

My ACCESS, A Computer Program That Scores Essays Electronically

Developmental faculties who have large classes and time constraints should welcome My ACCESS, as an instructional technology tool that assists both faculty and students in the writing area. This system, developed by Vantage Learning (www.vantage-learning.com) uses Intellimetric™ (Vantage Learning, 2004), an artificial intelligence system that uses a modeling approach to score essays electronically. Computers can learn the process and components of scoring essays, in much the same way as expert human readers are taught. In college writing courses, students can get immediate feedback from their writing and continue to repeat the process to improve their writing. How reliable is the scoring? According to Vantage Learning and other research studies, it is as reliable as expert human readers and in some cases more reliable (CCW, 2000). When the computer is asked to score essays, it uses the same rubric to score essay number 500 as it does to score essay number 1, with the same results (CCW, 2000). The program can not replace Reading and English faculty, but it can assist them in working with more students by giving the students more feedback, and frequency of writing by having access to the system using the web. Instructors can track students writing over time using online portfolios accessible (24/7) and they have an opportunity to revise their writing as appropriate. The online literary prompts cover a range of writing prompts including narrative, persuasive, or informative.

"The benefit of using this type of technology . . . is that it ensures consistency," said Kimberly B. Tulp, a spokeswoman for the Education Leaders Council, which formed the ABCTE together with the National Council on Teacher Quality. "Second it is time-efficient." (Blair, J., 2003, p. 1). Human expert assessors or graders set up guidelines to help distinguish high-quality essays from those that may be deficient. According to Tulp, the computer system is programmed to recognize the features needed for improvement.

Educators like Gael Grossman, director of English, Language and Philosophy at Jamestown Community College, and Gary Greer, assistant dean of University College and Director of Academic Counseling at the University of Houston Downtown, are finding that technology can be the motivating carrot itself, especially when it incorporates instantaneous feedback tools and self-paced instruction. Both use writing assessment technologies from Vantage Learning for placement purposes, "Technology created out of frustration over the lag time for either standardized tests or for even instructor feedback," said Scott Elliot, chief operating officer for Vantage Learning. My ACCESS places incoming students into appropriate writing classes, and assists already-placed students with their writing skills. Students receive immediate, line-by-line feedback, allowing them to practice and revise their writing. "Some students will completely scrap their work or get down to the bare bones, walk away from it, and then come back and revise," said Grossman. Students placed in lower-level English classes use the program before classes start to train themselves on how to write an essay and to then retest and hopefully

move into more advanced classes. "English teachers have a lot of tricks for getting students to practice, and this is one of them," said Grossman.

The latest version of My ACCESS is a web based version that easily allows students to upload their essays on the site for them to be quickly graded and marked with comments to help them improve their writing skills. The most recent version includes customization features that allow teachers to add their own writing prompts and tailor the teaching and learning environments to the specific needs of their students. The reporting functionality of MY ACCESS is one of the key functions that allow faculty to identify student and group strengths and weaknesses and to create timely intervention strategies after reviewing the reports. The My ACCESS reports include (Vantage Learning, 2004):

- Performance Summary
- History
- Error Analysis
- Early Intervention
- Roster
- Batch Student Reporting

Faculty can view student writing graphically. The data can be aggregated and disaggregated by filtering based on class or group, test, grade level, language, score scale, ethnicity, economic status, program, gender, and date (Vantage Learning, 2004). The software uses adaptive-response technology to help differentiate student feedback. Instructors can also customize their grading to accommodate individual needs or the

students. The students can have online portfolios to keep track of drafts, feedback and scores (THE Journal, 2003).

Figure 5 shows a Faculty View of My ACCESS followed by Figure 6 with a display of a Student's View of My ACCESS.

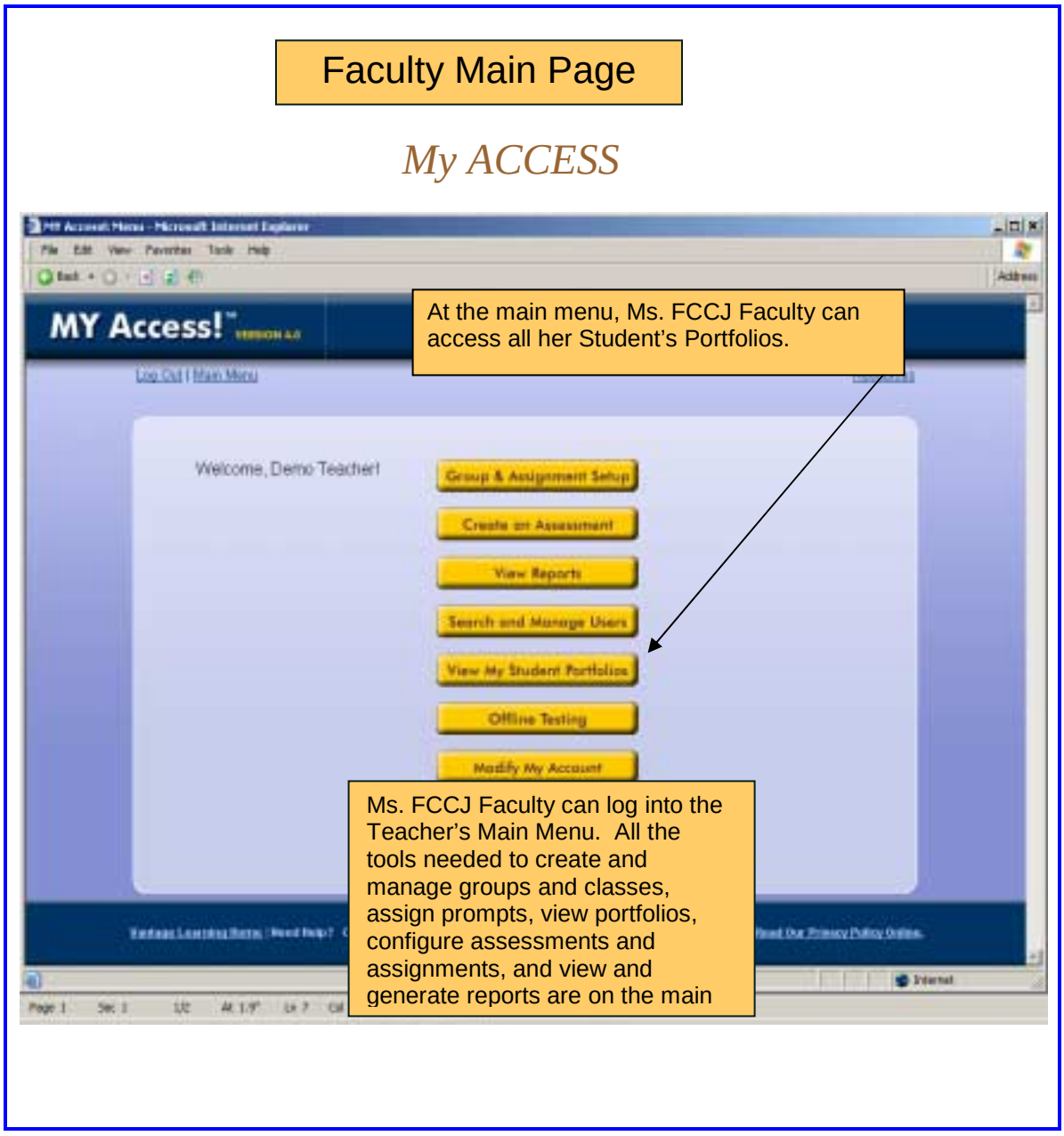


Figure 5. Faculty view of My ACCESS from computer program. Source: www.vantage.com

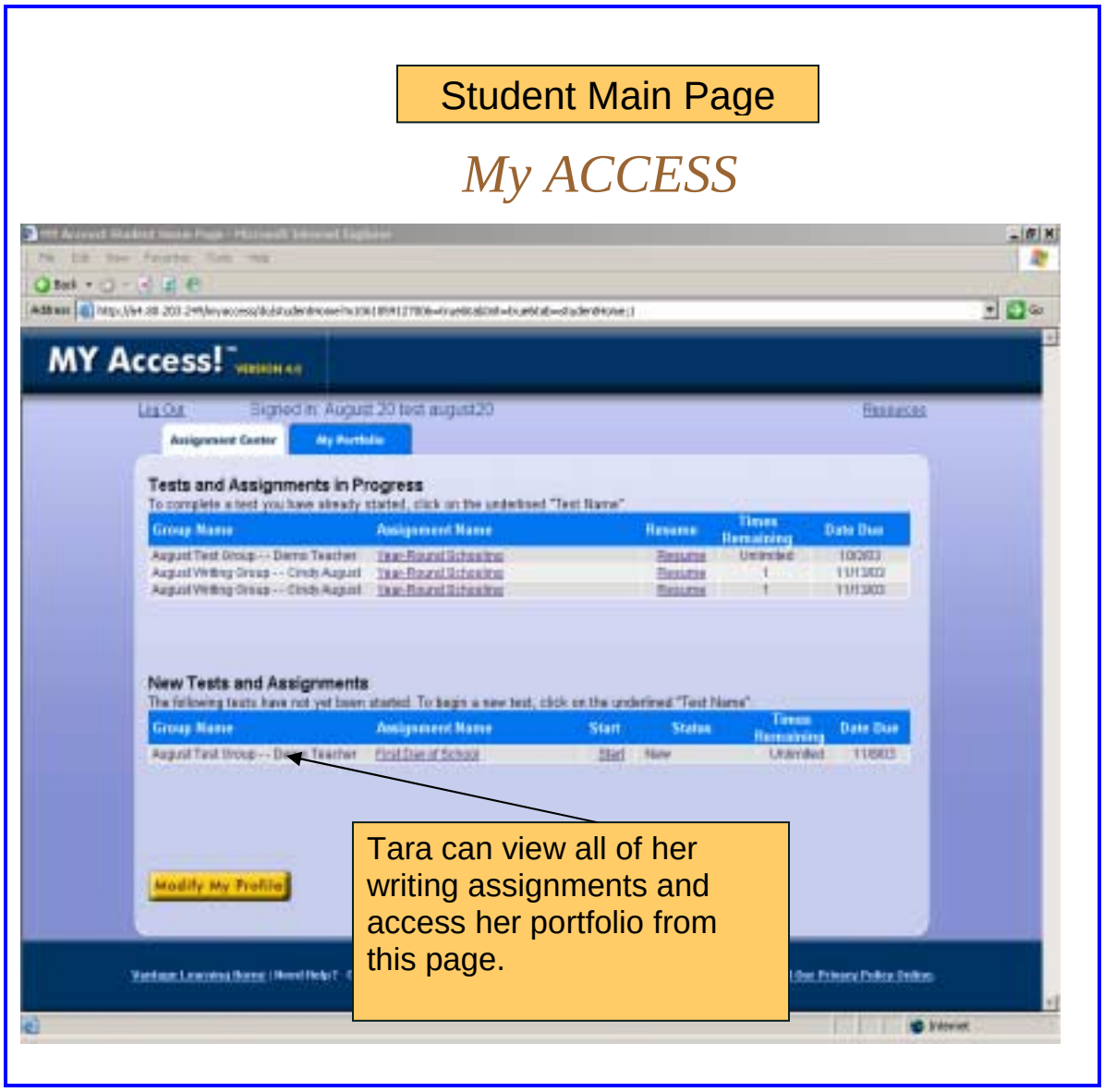


Figure 6. Student view of My ACCESS from computer program. Source: www.vantage.com

Resistance to Change

In an attempt to generalize the different views faculty have of technologies, Hagner and Schneebeck (2001) divide faculty into four "waves". The first wave are the entrepreneurs, which described as the "vanguard of innovation and risk taking in teaching

and learning" (p. 3). The second wave consists of faculty, who are also committed to quality learning, but are adverse to the perceived risks involved in using technology. The third wave are the group of faculty who are influenced by rewards and incentives and if this group sees the benefits of technology in terms of tenure, promotion, and financial, they are more willing to adopt new technologies. The fourth group, "the reluctants" were not viewed as a wave because members of this group are firmly and unwaveringly committed to the traditional models of teaching and learning. As suggested by Hagner and Schneebeck , the first step in moving an institution toward a wider acceptance of technology-based learning is to know the makeup of the faculty. The risk-takers will move ahead at a deliberate speed, but often the methodologies and strategies developed by this group are not transferable to other faculty. Many teachers have had difficulty, both philosophically and practically speaking, embracing and integrating technology in the teaching and learning process and recognize that the "challenge for today's college or university is how to change its environment to accommodate and promote the use of…new technologies" (Hagner & Schneebeck , 2001, p. 1). At many institutions, there is a conflict of the culture of faculty with the pressure for change in the delivery of learning that technology presents. If technology is to be integrated on a college-wide basis, consistent course standards and templates should be developed.

Summary

This chapter has reviewed the relevant literature, including the role of instructional design and instructional technology as it relates to adapting to new

technology. Learning theories, motivation theories, innovation and rate of adoption theories and diffusion theory in instructional design and their influence on the educational technology design process were also discussed. The role and the need for more technology in developmental education was reviewed. Finally, a review of the literature related to the importance of faculty and teams to the change process as well as the importance of identifying change-agents and change-resistors to facilitate the transition from traditional teaching styles to technology enhanced instruction was reviewed. Chapter three discusses the methodology for this study.

"Any technology has to prove that it will ultimately improve or expand learning" (Milliron, 2004).

Chapter 3

Methodology

Introduction to the Methodology of the Study

The purpose of this chapter is to describe the research methodology, and procedures used throughout the study. Participants are identified, sampling methods provided, and the data collection process is explained in detail. A broader discussion of Interactive Qualitative Analysis, the methodology chosen for the research design, a description of the participants, and a discussion of the chain of evidence is also included. The chapter begins with a review of the research questions developed for the study.

Research Questions

1. What are faculty perceptions of adopting new technologies like My ACCESS as a tool to improve the writing of community college students?
2. What motivates faculty to adopt and integrate new technology into their courses and instructional design?
3. How can administrators support faculty in the adoption of new technology in instructional design?

Rationale for the Case Study

From August 2004 through December 2004 the researcher served as an Administrative Intern at Florida Community College at Jacksonville working with Dr. Don Green, Executive Vice President (EVP) for Instruction & Student Services. As a graduate intern in the EVP's office, the researcher was granted unlimited access to all

aspects of the college to conduct the case study and research. Florida Community College was chosen in part, because of its reputation as a leader in the field of technology and innovation nationally and throughout the state of Florida.

Florida Community College at Jacksonville (FCCJ) is a large distributed college with five campuses and seven centers. Each campus is located in a different geographical area of Jacksonville and has a campus president that also governs a nearby center. The college functions as one college with one college president and several campus presidents each with its own organizational structure and programs. Although the organization is somewhat distributed, there is one college catalog that describes all college programs offered.

In 2002, FCCJ was rated the “most wired” two-year college in the nation by Yahoo Internet Life for their technology programs and resources. The 2003 Digital Community Colleges Survey as ranked by the Center of Digital Education, in partnership with the American Association of Community Colleges (AACC) ranked FCCJ number one in the 'large-urban' category in the nation. The survey annually studies how our nation's community colleges are using information technology to provide quality service to their faculty, students and the public. In the fall of 2004, the administration and communications faculty were reviewing a new Web based software tool, My ACCESS that could be used to improve writing for students. The adoption of this technology was approved Dr. Don Green Executive Vice President of Instructional Student Services. The data collection and documentation for the study was conducted during the fall 2004 graduate internship.

Research Design

Research design is a mechanism used to foster consistency within this type of study. It involves framing research questions, research setting, and the population. More importantly, Bechhoffer and Paterson (as stated in Ritchie & Lewis, 2003) say, "a good research design . . . requires the researcher to decide on the best ways of collecting data in research locales which will permit meaningful and insightful comparisons" (p. 50). In this study a purposive sampling was used to select the subjects based on the Web based writing project and the case study on analyzing faculty perceptions on adopting new technology over time. The communications faculty on four of the college's campuses who teach writing were selected as participants for the study. Forty-one full-time faculty who teach Reading, Developmental, English, Adult Basic Education and GED writing courses on the campuses were identified. Twenty-one of the forty-one targeted for the study elected to be interviewed. Each respondent was provided the option of anonymity for research purposes. Using the focus group and individual interviews, the researcher was able to identify affinities and relationships between the affinities in the study. Each interview transcript was evaluated to extend the affinities and relationships identified in the focus group session and individual interviews. Appendix A contains a description of the focus group session activities and the faculty responses from the focus group. The communications faculty focus group session identified several common themes or affinities that describe their experiences in adopting new technologies in instructional design. The affinities that were used to develop the faculty interview protocol are listed in Appendix B. A description of the communications faculty containing their discipline

and number of years of teaching experience from the four campuses are provided in Appendix C.

Interactive Qualitative Analysis (IQA) as a Method

Remembering Kuhn's (1970) paradigm that beliefs and values are our personal understanding – beliefs – of what is real influences our preference – values – for ways of knowing; this, in turn affects our judgment of what differentiates good research from bad research, or what differentiates true claims from false claims.

Beliefs and Values espoused in IQA

The following is a list of the ideological dimensions espoused in the beliefs and values of Interactive Qualitative Analysis (Northcutt & McCoy, 2004, p. 16):

- IQA presumes that *knowledge and power* are largely *dependent*; that power influences which knowledge is determined to be relevant and irrelevant, important and unimportant. The methodology reflects this assumption most obviously in its conception of constituencies as an important component of the research design phase, and also by including planned comparisons of the conceptual maps (mindmaps) among constituencies.

- IQA presumes that the *observer and the observed are dependent* (or perhaps more accurately, interdependent). IQA begins by challenging two common assumptions, apparently borrowed without much thought from the positivist paradigm, of much qualitative research: (1) that data collection is separate and distinct from analysis and (2) that only the researcher is qualified to interpret the data.

- The *object of research* in IQA is clearly *reality in consciousness* (the phenomenon) rather than reality itself, a construct that IQA contends is far too elusive for any one research study. The use of group processes as a data collection device presumes that the researcher can gain useful insights into a cordially constructed reality.

- IQA insists that both *deduction* and *induction* are necessary to the investigation of meaning. Participants themselves are first asked to induce categories of meaning (induction), then to define and refine these induction and deduction) and finally to investigate deductively these relationships of influence among the categories (affinities). These three stages of data production/analysis (IQA contends that there is no great difference between these two, that they are both interpretation).

- IQA contends that decontextualized descriptions are useful and possible as long as they are backed up or grounded by highly contextualized ones, and as long as the process by which the text was decontextualized is public, accessible, and accountable.

- Largely as a result of its stance vis-a‘–vis level of description and primary logical operation (both induction and deduction), IQA is clearly *favorable to theory*, both from the point of view of inducing theory and testing it. The *mindmap* of a group or an individual is, in fact, a *theory* by the classic definition: Campbell & Stanley (1963) define a theory as a set of relationships from which hypotheses can be induced (Northcutt & McCoy, 2004, p. 17).

IQA Interviews

The IQA interview is open-ended and semi-structured. It's designed to capitalize on the detail offered by the open-ended emergent interviews conducted by the researcher / facilitator. The interview questions were designed and based on the affinities and sub-affinities developed by the focus group members.

> An IQA interview protocol is designed to achieve specific objectives, each of which relates directly to the research questions of the study. IQA interviews serve to add richness and depth description of the meaning of affinities that is not possible with a focus group alone. They allow for individual mindmaps, which can be sued in a debriefing session as an interpretive aid to the investigator (Northcutt & McCoy, 2004, p. 48).

Case Study

Creswell (1998) defines case study as an exploration of a "bounded system or a case over time through detailed, in-depth analysis collection involving multiple sources of information rich in context" (p. 61). Creswell (1998) refers to it as a bounded system

because it is bounded by time and place and involves a specific unit of analysis, which may involve a program, an event, an activity or individuals. According to Creswell (1998), the multiple sources of information used in case studies include observations, interviews, audio-visual material, documents and reports.

Stake (2000) defines a case study as both a process of inquiry and a product of the inquiry and delineates case studies into three broad categories – *intrinsic*, *instrumental*, and *collective*. The purpose of *intrinsic* case studies is based on the interest of the case itself and not necessarily to develop theory. *Instrumental* case studies are designed to provide insight into an issue or to redraw a generalization. According to Stake (2000), in instrumental case studies, the case is often of secondary interest, serving in a supportive role in order to facilitate our understanding of something else. The case is still examined in-depth, its contexts elaborated on, and its ordinary activities detailed, but the larger purpose of the research is to pursue "external interest". Stake (2000) defines *collective* case studies as the investigation of several cases that will lead to a better understanding of a still larger collection of cases. Stake admits that the boundaries separating one type of case study from another are not always distinguishable. For the purpose of this study, Stake's description of an instrumental case study seems most relevant, as the findings of the proposed case outlined in this report, potentially, could be used in an anecdotal fashion to inform the design and development process of technology-based courses in other, similar settings to the focus of this study.

Yin (2003), considered a preeminent authority on case study research defines a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context

are not clearly evident. According to Yin (2003), case study research is the preferred strategy when a "how" or "why" question is being asked in the context of the study. Case studies employ a variety of data collection procedures. Yin (2003) outlines several sources of information for the collection of data: (1) documentation; (2) archival records; (3) interviews; (4) direct observation; (5) participant observation; and (6) physical artifacts. All of these various methods and sources were employed for the purpose of collecting data for this study.

Chain of Evidence

As another method for increasing reliability of the study, Yin (2003) advises researchers to provide sufficient documentation and citations within the case study report that would readily demonstrate evidence of coherency and consistency throughout the study. Yin (2003) offers several options for a systematic approach to analyzing the data. The first method of analysis he discusses is to compare the data with the original theoretical propositions made in the study. A second technique is to analyze the data in the context of rival definitions, which essentially means that a theory other than the theory proposed in the study offers a better explanation for the results. A third approach and the one most suitable as the primary approach to this particular study are "developing a case description". Yin proposes this technique for analyzing the data for case studies where the original purpose was descriptive. The descriptive framework also helps organize the case study analysis (Yin, 2003, p. 114). This chain of evidence was created in Inspiration databases, Microsoft Word and Excel, and PowerPoint to capture the affinities, relationships, and final System Influence Diagrams developed in the study.

Ethics

Focus groups and interviews and other methods of data collection were commenced once Institutional Review Board (IRB) approval from the University of Texas at Austin was obtained. Participants included in the study were given a copy of the approved IRB and asked to sign a written consent for the interview. Interviewees were given the option to withdraw from the study at any point in time. Pseudonyms were assigned to the participants to protect their identity.

Data Collection of Focus Group

The procedures for data collection included a number of activities that provided a significant amount of qualitative data including affinities or themes, and affinity relationship tables (ART) that show relationships or influences in a system. The first step was to take the focus group through a warm-up exercise described in Appendix A where each participant was asked to tell more about their experiences with technology in their courses and whether or not they used technology in their classroom activities. The thoughts and ideas were related to adopting technology in the instructional design process. This focus group session clearly identified five affinities or common themes during their discussions that were placed in an Affinity Relationship Table (ART). Each affinity was given a name and number and paired with all other numbered affinities.

The next step was to determine if a relationship existed between each affinity and if the affinities influenced each other. For Affinity1 and Affinity2 there were three possibilities; Affinity 1 influenced Affinity 2; Affinity 2 influenced Affinity 1; or no relationship existed between the affinities. The patterns of influence were determined by the focus group and placed in a tabular Interrelationship Diagram (IRD). Once identified,

these patterns of influence show cause-and-effect in relationships. The patterns of influence can be identified as primary drivers, secondary drivers, secondary outcomes, or outcomes in a system resulting in a composite System Influence Diagram (SID). A review of the IQA process including ART, IRD, and SID for the focus group is shown in Figures 7 through 15. The Focus group iteration process was recorded in Excel tables and Inspiration diagrams.

The direction of each affinity influence was determined by the focus group. Every relationship in the IRD was coded by code order and by frequency order. If relationships were established in both directions between affinities, then the highest frequency was recorded with the most influence. A primary outcome is influenced by many other affinities in the system and has very little influence on other affinities, whereas a primary driver has heavy influence on other affinities that occur later in the system.

Focus Group
Affinity Tabular IRD

Affinity Name
1. Emotional Environment
2. Physical Environment
3. Acclimation
4. Classroom Activity
5. Instructor Interaction

Figure 7: Focus Group Affinity Table

Focus Group Combined Interview Theoretical Code Frequency Table			
Affinity Pair Relationship	Frequency	Affinity Pair Relationship	Frequency
1 → 2	2	2 → 4	5
1 ← 2	5	2 ← 4	2
1 → 3	6	2 → 5	2
1 ← 3	1	2 ← 5	5
1 → 4	5	3 → 4	1
1 ← 4	2	3 ← 4	6
1 → 5	1	3 → 5	1
1 ← 5	6	3 ← 5	6
2 → 3	5	4 → 5	1
2 ← 3	2	4 ← 5	6

Figure 8: Focus Group Combined Theoretical Frequency Table

Focus Group Tabular IRD								
	1	**2**	**3**	**4**	**5**	**OUT**	**IN**	**Δ**
1		←	↑	↑	←	2	2	0
2	↑		↑	↑	←	3	1	2
3	←	←		←	←	0	4	-4
4	←	←	↑		←	1	3	-2
5	↑	↑	↑	↑		4	0	4

Figure 9: Focus Group Interrelationship Diagram (IRD)

Count the number of up arrows (↑) or *Outs*
Count the number of left arrows (←) or *Ins*
Subtract the number of *Ins* from the *Outs* to determine the (Δ) *Deltas*
Δ = Out- In

Focus Group Tabular IRD – Sorted in Descending Order of Δ								
	1	**2**	**3**	**4**	**5**	**OUT**	**IN**	**Δ**
5	↑	↑	↑	↑		4	0	4
2	↑		↑	↑	←	3	1	2
1		←	↑	↑	←	2	2	0
4	←	←	↑		←	1	3	-2
3	←	←		←	←	0	4	-4

Figure 10: Sorted Focus Group IRD

Focus Group Tentative SID Assignments	
5	Primary Driver
2	Secondary Driver
1	Circulator / Pivot /
4	Secondary Outcome
3	Primary Outcome

Figure 11: Focus Group SID Assignments Primary, Secondary

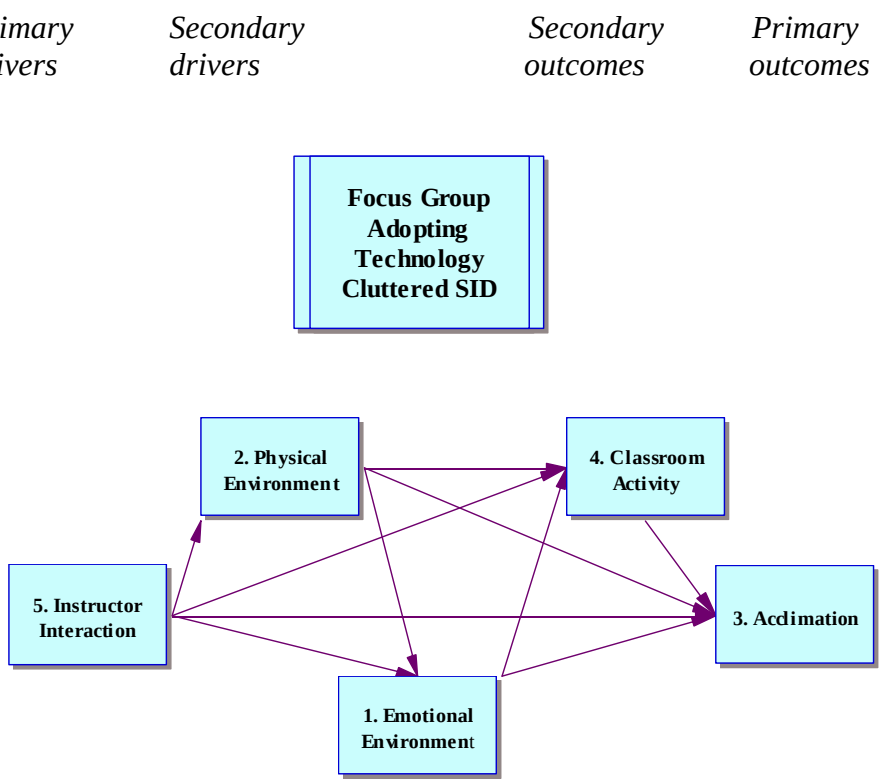


Figure 12: Focus Group Cluttered SID

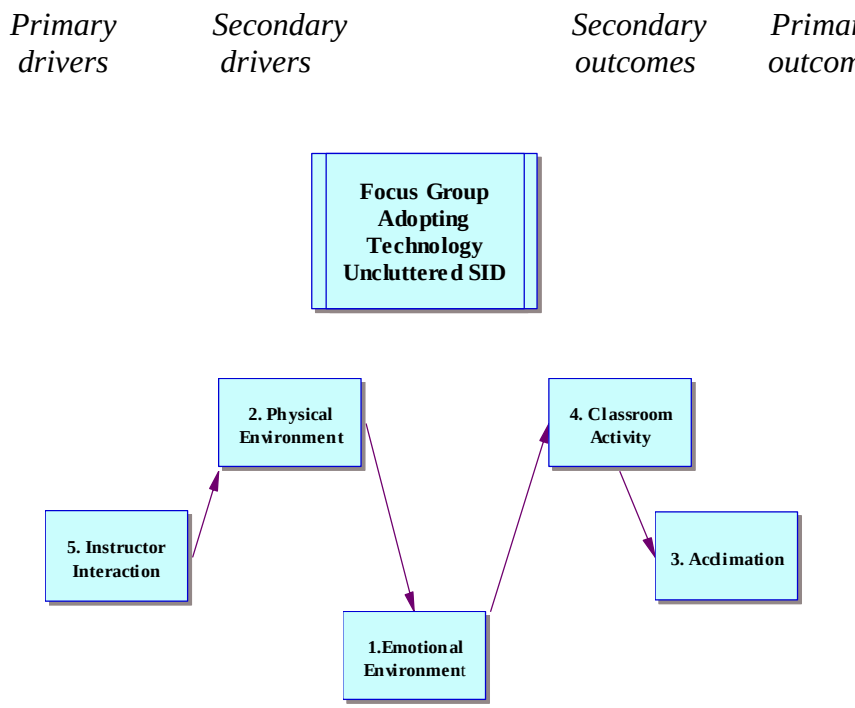


Figure 13: Focus Group Uncluttered SID

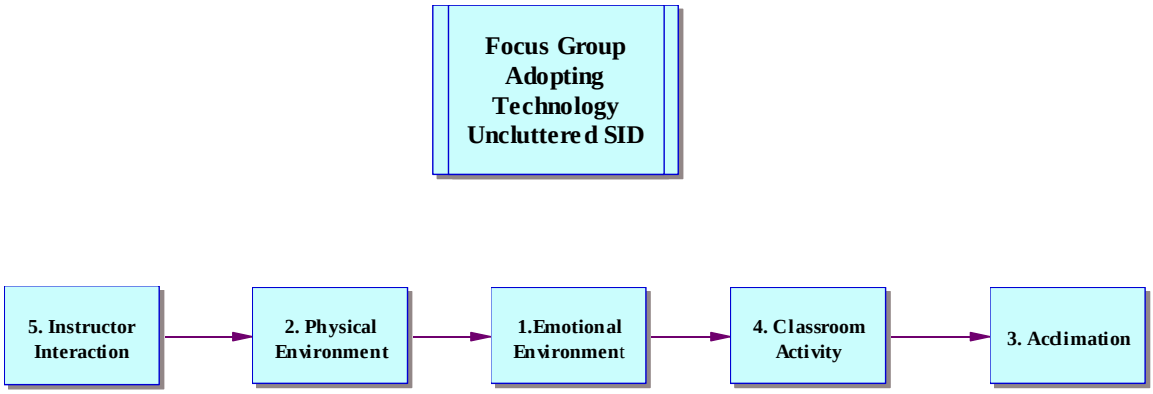


Figure 14: Focus Group Uncluttered Numerical SID

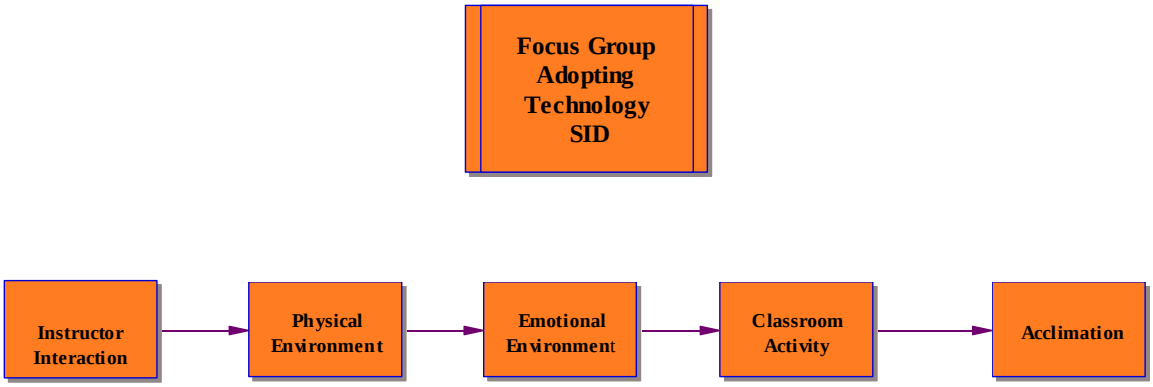


Figure 15: Focus Group Adopting Technology SID

Data Collection of the Individual Interviews

The interview sample size was not predetermined, but was based on how many individual interviews could be scheduled from the purposive communications faculty sample. Each faculty member was called to schedule a thirty to forty minute appointment for the interview at a time convenient for the faculty (usually during faculty office hours). Two days prior to the interview, a voice mail reminder and email was sent to the faculty to confirm the appointment. Interviews were transcribed and emailed to the faculty for accuracy and triangulation.

The purpose of the individual interviews was to get the faculty perceptions on adopting new technology for further analysis. The interview protocol used for the individual interviews is listed in Appendix B.

Documents

Yin (2003) pointed out that documentary information is likely to be relevant to every case study topic. It is expected that a number of different types of documents currently exist as it relates to the proposed study and additional documentation that was generated throughout the course of the study. Yin lists a variety of documents that can be the "object of explicit data collection" (p. 85): These documents include:

1. *Interviews*:

   Interviews can be one of the most important sources of information in a case study. Yin advocates a fluid rather than a rigid process to guide the interview process. Case study interviews are most commonly *open-ended* inquires, but also more structured approaches may be taken. This study used both methods.

2. *Focus Groups*:

   Focus groups conducted at each of the campuses was placed in Inspiration 7.5, an online tool used to create the ART, IRD, and SID used in this project

3. *Interview Protocol and Participants*

   The participants for the study have been identified in an earlier section and the interview protocol was created from the focus group session. All interviews were transcribed verbatim from audiocassette recordings and reviewed by the participants.

4. *Observation*:

   Yin (2003) describes two types of observations in case study research – direct observations and participant-observations. Direct observations can range from formal to casual data collection activities. In this study direct observations were

made of the faculty in the individual interviews and training sessions held to learn how to use the My ACCESS Web instructional tool.

5. *Field Notes and Journals:*

The researcher maintained field notes throughout the study that were recorded. The journaling provided the researcher an opportunity for reflection and analysis on an ongoing basis over the four month period. Field notes were used to capture main ideas, themes, and insights made during the formal observations and after informal discussions with participants. These notes were used to help facilitate recall in interpreting the data collected throughout the study.

Methods Used to Strengthen the Validity of the Study

Triangulation

Triangulation involves using multiple sources of information. Yin (2003) considers this to be a major strength of case study data collection. This study involved a relatively significant number of participants, twenty-one individual interviews, observations, and documents (e-mails, memos, minutes from meetings, design templates, etc.) were used as multiple sources for triangulation. The data was placed in Inspiration, a software tool used to compare IQA data elements provided after conducting the focus groups and interviews. Comparing the ART, IRD, and SID to field notes, emails, transcripts, and audio tapes provided multiple sources of information for this study.

Trustworthiness

Reliability, objectivity and validity are matters of interest in qualitative research. Erlandson et al. (1993) mentions "trustworthiness is established in a naturalistic inquiry by the use of techniques that provide truth value through credibility, applicability through transferability, consistency through dependability, and neutrality through confirmability" (p. 132)

Timeline

A timeline for data collection including focus groups, individual interviews, faculty training and a list of other participants in the study can be found in Appendix D. A timeline and schedule for the researcher is listed in Appendix E.

Summary

The aforementioned discussion defined the process used to collect data commencing with a discussion on qualitative research as a method, the research questions of the study, and the rationale for selecting the IQA and the case study approach. Interactive Qualitative Analysis (IQA) as a method and the data collection process for the focus group was also discussed. The process for the data collection of the individual interviews was also discussed.

This chapter has reviewed the proposed methodologies for this study, including a description of the research design specific research methods and techniques, including interviews, observations, triangulation, focus groups and interviews, and document reviews that took place as part the data collection process for this study. A detailed

description of the findings and data are presented in Chapter 4, and the final analysis is discussed in Chapter 5.

"If we understand the human mind, we begin to understand what we can do with educational technology."

(- Herbert A. Simon)

Chapter 4

FCCJ Communications Faculty Speaks

Problem Statement

The purpose of this study was to gather the perceptions of faculty in focus groups and individual interviews as they adopt new technology over time. The technology selected, My ACCESS allowed faculty and students to assess essays holistically and analytically over the Internet. This writing tool could be used by faculty in all communications writing classes to improve students' writing offering direct feedback to both faculty and students.

Identify Constituencies

The constituencies were the communications faculty at Florida Community College in Jacksonville Florida who teach writing in English, Developmental, Reading, and Adult Basic Education courses at the college.

Research Questions

1. What are faculty perceptions of adopting new technologies like My ACCESS as a tool to improve the writing of community college students?

2. What motivates faculty to adopt and integrate new technology into their courses and instructional design?

3. How can administrators support faculty in the adoption of new technology in instructional design?

The Participants

All communications faculty were full-time communications faculty. Forty-one were identified on four campuses; however twenty-one elected to be interviewed. Eight faculty from Campus A, five faculty from Campus B, three faculty from Campus C, and five faculty from Campus D were interviewed by the researcher**.**

Identifying Affinities

Seven of the twenty-one faculty interviewed attended the initial focus group session described in Appendix A. They were asked to tell the researcher more about their experiences with adopting new technology in their classes at FCCJ. As a result of the focus group five affinities were identified that influence adoption of new technology in instructional design: Emotional Environment, Physical Environment, Acclimation, Classroom Activity, and Instructor Interaction.

Interview Protocol (Part 1 Axial)

The interview protocol described in Appendix B was used to describe each of the affinities during the interview. A copy of the interview protocol, along with a one page summary of the research study was given to each respondent. The interview protocol consisted of two parts: 1) the open-end *axial interview* designed to provide rich description of each of the affinities identified; and 2) the structured *theoretical interview*

designed to identify relationships between affinities. The communications faculty composite axial interviews are addressed in this section.

Composite Affinity Descriptions From Faculty Interviews

The interviews were transcribed word for word from audio tapes. Once the transcripts were complete, the researcher analyzed the text for axial codes that illustrated each of the affinities. The researcher documented each of the references by interview, line-number, and affinity number in individual axial code tables and also created a composite interview axial code table of all interviews. Combining text and illustrations into one table allowed the research to create a database for the entire set of respondents containing all axial codes for all affinities, and a link or reference by transcript and line number that produced each code.

Each affinity was examined separately organizing quotes for affinities into sub-groups. The sub-groups contained quotes that addressed a common theme taken from the interviews. Multiple quotes were compiled together to develop a composite quote for each affinity. The next section is a composite description of affinities based on quotes compiled from all the communications faculty interviews. The researcher has used the IQA methodology in presenting the (*Rules of Evidence*) for the composite description of affinities for the faculty interviews at FCCJ. The important features of those rules include the following:

- The paragraph begins with a sentence in bold and is the voice of a participant.
- The second sentence contains a noun or phrase used as a noun that is italicized and is the voice of the researcher.

- ❖ The remainder of the paragraph is enclosed in quotes and is the voice of the participants (Northcutt & McCoy, 2004, p. 319).

Instructor Interaction

The instructor interaction with the students can have an enormous impact on students in their interest in the subject matter and their participation in class. The researcher described the instructor interaction as the enthusiasm, caring, support, and energy that the instructor brings to the classroom in the individual interview protocol with faculty. The respondents were asked to tell more about instructor interaction in their classrooms as it relates to technology use.

I'm very enthusiastic about technology and I share that with my students. *Faculty suggest that having an upbeat and enthusiastic attitude about the subject matter and using technology to enhance it can be infectious with students*. "A lot of that comes from the fact that technology is advancing so rapidly. We offer a lot in our career development center to assist our students if they take little workshops in the center. I give them extra credit for that. But, let's face it; Sometimes it's hard to be real interesting when it comes to English and Reading. A lot of students may be resistant to the subject matter. What I try to do are activities that engage them in learning in a fun-filled environment. I'm not talking about Kindergarten, but there's nothing wrong with making learning fun with activities that are age appropriate. It's important to me personally as an instructor to keep the tone and pace of the class going. I think that's a great part of why my students take my classes; through word of mouth or through friends who have taken my class before. On all of my evaluations it's listed that I'm extremely enthusiastic. If there were negative comments, they might say that she's too enthusiastic. Especially at 8:30 in the morning. That's my personality. That's who I am. I bring a certain enthusiasm for the subject matter, but of course that'll be heightened if the class feels the same way. A lot of my classroom is built from examples from my real life. For example, I try to bring in my guitar every once and a while, just to demonstrate something with the students. My non-fiction class has been reading a lot about Mount Everest and the disaster that claimed eight lives there. I bring my Martin Backpack guitar which is the same type of guitar that's been taken to base camp at Mount Everest. I'm able to print and bring in the prayer flags, which are similar to the flags that they fly at the top of Mount Everest. Things like that, I think that shows them my enthusiasm for the subject. It helps to explain ideas. We discuss that. In some ways, I'm not too afraid to make a fool of myself. Sometimes I feel like I really have a class that responds to what I'm doing and

then other times they do not. I have a certain kind of style that I gravitate to. I never felt like they disrespect me. I've been lucky there. You go from one class to the next class and the energy level of the two classes is different. I'm always trying to figure out how to tweak my class for the personalities that are in them."

I'm a very hands on teacher and I love teaching writing. *Faculty can make a difference by working hands on with students and offering encouragement along the way.* "In my traditional classrooms they write in class. I give them about half an hour to get something on paper, and then I just start working the room. I give them suggestions. I try to be encouraging, but I try to give them at least one or two ways to change what they have down already. I'm very hands-on in that respect. I do a lot of group work also. I try to be a good leader and cheerleader. I don't just give an assignment and sit at my desk. When we go to the computer lab, if we're just going to draft, then I do the same thing. I'm walking the room; looking at what they're doing and pointing out mistakes. I might make the comment; think about that, and then I walk off. I feel that I'm an interactive instructor. I let them use MySkillsTutor without my interference because I want them to learn from the program. Our instructor interaction is very upbeat. I use a hands on approach. Among them, I'm instructing them as we go. I like to let the students and I come together and just construct the energy level. It's very active."

A lot of the computer programs that I use are really interactive and they make noises. *Faculty and students love to use technology interactively to relax the environment.* "We laugh about those kinds of things. Sometimes, they feel like they're playing video games. There's nothing wrong with that. We don't want to do that all of the time. You want to create a relaxed fun-filled environment if possible. A lot of constructive learning comes out it. They do make progress by using technology interactively. Some students get tired of the same approach. That's why I feel like they prefer being more interactive and working in groups having different types of learning experiences. And then, I may move back to the PowerPoint to discuss lecture. Some professors, all they do is PowerPoint. They don't lecture or allow the students to break out into groups and become more interactive. I use a very varied approach to teaching. We do gaming for word parts for Greek and Latin word parts because that's one way that I've found that allows them to hear words over and over again. We do a lot of cooperative education, we do some individual work; we do some independent choice. I do lecture about seven times a term. We go online for critical reading and look at what different people recommend. We pull information from the New York Times and I teach them to use some of the search engines that are out there. And some people think that the variety is bad. They might say, on Tuesday, they should be doing this to keep the activities consistent from week to week and day to day, but I don't think so. My students don't seem to mind that I don't do it that way. Every once in a while, I'll get someone who likes more consistency, but most of them are like; Oh, what's she going to do next?"

Technology does create a gap, but sometimes we can fill that gap by working together. *Students love a timely response from their instructor, especially those that are sent electronically.* "Even though pedagogically it doesn't mean much that I answer them

quickly, they put a lot of emphasis on when I respond. For example, one of my students is having trouble with Blackboard and she sent me a thank you for working online with her today to resolve the issue. I just got this note: Just wanted to thank you for your quick response. You seem to really care about your student. Sometimes, it's just helping them with an issue with the technology, not course content. I feel that helping students overcome obstacles helps with my retention. Once we've made a connection, even if it is for a technology support matter, I feel like they know I'm there for them. We can fill that gap by working together. I love the subject. I don't like to give them a poor grade. I try to help them to grow as a writer. I routinely get emails from students saying thanks for your help and feedback, it means so much. That's all that they have. If I don't respond to them in time, then they come to the decision that I don't care anything about them. At times, I email them back at 11:00 or 11:30 on Saturdays. It helps me with my workload and they think, oh my goodness, she's responding to me already. Through the technology, online, your enthusiasm and interaction with you students can come through. Whether or not the student recognized it or not is a different story."

I don't care about how much you know, professor, until I know how much you care. *Faculty believe that showing students that you care makes a tremendous difference in establishing a connection, a rapport, and keeping the students interested.* "In my research, I have found that a close rapport between the student and the faculty member is instrumental to student success. I really believe that it is what makes or breaks a developmental class. You have to let them know that you care about them. It's that sentiment that motivates a professor to make his or her presence known. I care about each and every one of my students as an individual. I know everybody is here for a reason. They're here either to improve their life and I see myself as being a person that can help them. I can't click my fingers and make everything better, but I can ask them, how was your day? I care about them and I care about their grades. The first week of school, every day we do an activity that tries to make this a community. We try to get them involved, and working together, and working with me. I tell them when I'm available and post my office hours. I call some students if they're absent two days; sometimes if they're absent on one day. If they're sick, I don't get on their case about it. I'm pretty firm with them. We're working steadily towards our goals."

I play different roles in the different classes that I teach. *Whether I'm acting as a coach, a cheerleader, or an instructor, I'd like my students to observe me in different roles.* "For example, in the developmental section, I'm really more of a coach that anything else. I'm trying to get their writing up to a certain level, but ultimately; someone else grades their exit paragraphs. All of the exit paragraphs that I grade are from someone else's class, and all of my students are graded by someone else. So, it's not just one person that determines whether a student passes or fails. They understand that if I'm hard on them for a paper; it's because I want them to exceed the expectations of those other graders. I'd like them to be able to do that."

The whole relevancy factor is always there; if students don't see how it's going to do them any good, it's going to be harder to get them to use technology. *Whenever*

faculty make technology relevant to the subject matter and the real world it helps students make a connection to everyday life. "I bring a great deal of enthusiasm, and materials that are relevant. I try to make the connection for students to everyday life. I try to show them how using the technology as a learning tool they can become more independent. They can make their way around. This type of technology will make it possible to succeed in other college courses and jobs that will require them to use computers. You can bring the content, and if you're not relating and making that student feel welcome when they come into the classroom, you're teaching is not going to do very well. You're not going to have that bond with them."

I'm much more comfortable teaching my students English than teaching them about technology. *Faculty should feel comfortable with the technology available to them in the classroom. If they don't, then they probably will not use it.* "I want to focus more on writing. I don't want it to be a technology class, but a writing class. Sometimes, I worry that as an institution we have to be pro technology, but we also have to take a real look at who our students are. At the very least, make sure that they're competent at using computers. If computers are going to be a requirement, then we need to go back and look at our courses and pre-requisites for them. Well I think I get along with my students fine. They understand that I'm their teacher and I'm grading them, and there's that little bit of distance, but most of them feel comfortable in coming to me and asking me for help. I worry about my passive students. I try to get a better handle on the ones that come to class and don't participate."

Classroom Activity

The researcher described the classroom activity as the individual student and group interactions in the classroom that are planned by the instructor. The respondents were asked in the individual faculty interviews to tell more about classroom activity in their classrooms as it relates to technology use.

I prefer an engaged classroom of cooperative learners. *Faculty really do have preferences of when to use technology and how they'd like to engage their students with it.* "My classes, they're not a bureaucratic type classroom where I'm completely in charge. It's more of what I like to think of as an engaged classroom. I'm not always in the front of the classroom. I start at the front of the classroom, doing my little routine teaching for them, but I try to get them involved. I'll have my students break up into groups and do a lot of cooperative learning. I try to introduce them to the technology and almost all my classes have some component of technology. In most of my courses, we almost always throw in a component of Web. Whether it's for Email or I'll tie it in with maybe extra credit. You're not required to go there, but you'd be surprised at students; they see how easy it is to do and get those extra points. I try to use a variety of classroom

activities so the students don't get bored. I remember when I was in college, a lot of professors just stood there and talked and it got boring after a while. I don't want to bore my students. Sometimes I will let them Email me assignments and I will email them back a response. Sometimes I will give them an assignment that may be due Friday. I will state in class that if they do the assignment early and email it to me by Tuesday night, I'll proof read it, give them my opinion and email it back so that they can rewrite it. In some cases they will email the work to me. In many cases that helps me to get some of the work earlier so that I can grade it and get it out of the way, and it also gives them practice writing and using technology to communicate with me regarding the grading results. Sometimes, I will offer them five points bonus if they will do the work early and mail it to me. You'd be surprised at what a student will do for five points."

I'm trying to find individual and cooperative activities that make the computer become an extra partner in their learning. *Technology offers faculty a variety of delivery methods for presenting classroom activities to students.* "On occasion, I might ask my students to write an argumentative piece that they recently read about, say, stem cell research. We may take a class session or two to open up Microsoft PowerPoint and put together a presentation on what they just wrote about in that paper. On occasion when I see a need for remediation, for example, with commas; I might pair two of them together to do a Web quest together to find out more information about the comma, and then ask them to complete this twenty question exercise about the comma and send it to me as an email. If you both collaborate online to complete it, then each of you will get two points of bonus. The students seem to like the fact that we have this integrated technology. I ask them at the beginning of the class period, Do you want it on the projector or would you like the notes displayed on your screen? We're coming up with examples during the discussion and then typing them on the lead computer. I can use the software to bring it all up on their screen so they don't have to move to see the projector."

They can easily check what they've missed or check their grades at any time. *Blackboard and WebCT, two course management tools available to faculty at FCCJ can keep faculty and students connected outside of class.* "Blackboard has really helped me to get organized. I use Blackboard more for outside readings and things like that. The assignments that I give as handouts, I also post them on Blackboard in a folder. I do their grades on Blackboard. That has really helped out a lot. They can go and check their grades on Blackboard. I tell them to be sure to go and check their grades to make sure that I have not made a mistake. At any time, they should know where they are; where they stand in the course. I think for organization it really helps me and them. They can easily check what they've missed or check their grades at any time. In the computer lab, my COMP1 students and all my classes are connected to WebCT so that we can use the discussion board. In WebCT, I basically use the email and discussion board. When they work in groups they might post to the discussion board as a pair. They may post some of their writing that I've had them do. They may do research together. Each group might select a different article and summarize it and present it. We're almost always at the computers in the lab using Microsoft Word or in the discussion board or I may have them

summarize their group discussion in Word and give it to me. We use WebCT a lot. I prefer WebCT. Because, first of all I learned WebCT first and once you've learned something, it becomes easier. I like being able to place people in groups of four using WebCT."

I also feel that the group participation has elevated their learning. *According to faculty, collaborative learning can occur online or face-to-face in small groups.* "There's a different type of community that develops online. A comment posted by one student and responded to by another gets that student more involved in that they may not make that comment in class. But online, they're able to do that. Often times we are getting feedback and responding to each other's writings online. I also post lecture notes online that they need to read. They have the opportunity to post something that they've found, for example ineffective sentences. We may discuss in discussion groups what makes an effective sentence. That's typically what we do. We use the discussion board a lot."

Often technology is not very interactive enough for students. *Faculty suggest that using technology in the classroom does not preclude interactive classroom dialogue.* "I do a lot of lecture through PowerPoint and of course that and everything goes on Blackboard. I give them reading assignments, additional essays that they have to read and Internet sites that they should access. I also give them additional Websites that they should look at. Often students will go to a screen and read. In many cases technology does away with interactive dialogue. I use it as a springboard, but that's all that I use it for."

Even though some students may not be as computer savvy as others in the class, working together doesn't take away from their feeling of contribution to the exercises. *Peers teaching peers give both students involved in the peer mentoring a sense of accomplishment.* "At times, we'll read aloud; then they'll do something on the computer. They read to their partner, and their partner does something else. Also, it takes some of the fear away. We laugh at ourselves a lot. I try to encourage them by telling them that we all make mistakes, so don't be afraid if you hit a key and make a mistake. I'm right there, or someone else is there to help you get through it. I don't sit in front when they are working with the computers. I'm walking behind them. If they have a computer problem, sometimes they'll find that I can't solve the problem."

The greatest fear I think most instructors have of using technology is that they'll begin their class with technology and then, it won't work. *Some faculty fear that technology just won't work and may take up too much class time trying to make it work.* "That's why as teachers, we're trained to be flexible. If it doesn't work, as teachers, we should just pick up with some other song and dance until we can get it to work. I had difficulty with the cart laptops this term not being able to print to the printer in the room. They threw up some sort of error message on the screen that caused the computers to shut down and lose about 45 minutes of work that my students had began and not had a chance to save yet. And that's a shame. Since then, I've gone back twice and had no problem at all. I think it may have been some sort of Virus or something. As far as I

know it was corrected, but I'll find out for sure when we try that assignment again. The technology department took the cart out for about two weeks to repair it."

I have discovered that for the most part, they have got to do it to remember it. *Students need hands on technology experience to remember it.* "They need the hands on. If they don't put their hands on the computers and do it in front of me, it's not going to stick when they get home. For example, they had been working in WebCT. I was out on a Friday and I gave them an assignment and asked that they post the rough draft to WebCT on that Friday. Well very few did. When they came back to class I decided to do an assessment of why they did not post their assignments to WebCT. I said; just tell me why you did not post your rough drafts. Now these are students that have worked for a month and a half in the classroom using WebCT. Most of the ones who did not post had trouble posting their assignment. Either they couldn't figure out how to get in from their Internet at home or they had forgotten how to post. They really need that hands on experience. Several times we had gone to the discussion board and posted group replies, but we had not posted anything individually. So what I had to do was to go through a demonstration exercise in class giving each student an opportunity to post something individually."

Emotional Environment

The researcher described the emotional environment as a positive healthy learning environment where students feel comfortable and confident in their ability to learn. The respondents were asked to tell more about the emotional environment in their classrooms as it relates to technology use.

I think the emotional atmosphere that works best for me is one where students feel comfortable asking questions. *Faculty suggest that an emotional environment that is open to questions from students helps them to build their confidence levels.* "They feel comfortable approaching me as an instructor and they feel comfortable working with each other. They begin to get assurance from gradually completing activities that require a higher level of expertise. I think then as the semester goes on that the students reflect hopefully a progression of skills in the classroom that make them feel more confident. That creates a better atmosphere for better learning. If the environment is healthy, then they feel safe. I feel that students are much more responsive in a safe environment. To me, this is essential to anything that I do in the classroom."

As the years go by, students seem to be less and less resistant to technology. *Once they're exposed to technology, most students enjoy using it.* "We use cooperative learning quite a bit in my course. In my opinion, when I introduce new techniques, new

technology they love it. Most of the students enjoy the technology once they learn it. Contrary to what everyone thinks, our students are not all technologically adept. I don't think that they all have the skills. Once they learn how, most of them do fine. I've learned that I can't just say to my Freshmen students that this is what WebCT looks like, now go home and post your homework assignments using it. I have to review that there's a reply button and there's a post button. Things like that."

I think a lot of students who come to community college are in really different camps. *Faculty realize that all students in their classrooms are not at the same levels of expertise with respect to using technology.* "One of the things that I've found with my developmental students is that many of them are not comfortable with technology. What I try to do from the beginning is, I take them to the library or the resource center and I start introducing them to technology. As they progress through their college courses, they are more comfortable using it. My ultimate goal is to have them technologically ready for when they start taking other college courses; whether they are completely online, hybrid, or whatever. Some of them are really familiar with technology and use it at work all the time and then there are other students who don't use it in the workplace or who have been out of school so long that they don't feel well versed in the new technologies. Having to learn something new on top of this learning environment using grammar skills that they may not have used for years and years can be a challenge. Overall I think whenever students are given the opportunity to become comfortable with technology, I think they find it very valuable."

If you've got a resistive audience, one of the best ways to break down resistance is with humor. *Faculty believe that using humor in the classroom can ease the resistance to using technology.* "Also as far as emotion, I use an awful lot of humor. The fact of the matter is, students taking English / Writing are not that excited about the subject matter. I find that laughter helps with students a lot. I share with them the problems that I have had on the computer and how they have this natural affinity towards computers, whereas I had to grow to enjoy them. That helps them. One of the things that I find that I have to do with my students, when it relates to technology is I sit with each individual student. I also go from computer to computer. That helps them a lot."

First of all, it's only been in the last year or two that I've become more comfortable with technology. *It takes Faculty time to build a level of confidence with technology in order to integrate it into the classroom.* "Since I've been working with other faculty members on a collaborative technology project, I've become a lot more competent because I've had to take some classes. I've taught online for like three years and I was using the minimum amount of technology to teach the classes. But I've learned to integrate it into my classes. We have the Elmo projector and the Internet that I use to display things to them in projects and sometimes PowerPoint presentations. And the students really enjoy it. They enjoy it more than I do. They enjoy working on the computer using the different programs that we have here to improve their reading ability."

I work very hard to make sure it's positive. *Faculty insist that keeping a positive, optimistic attitude with respect to technology use helps students.* "I try to help them have a sense of security and a sense of optimism when they're in the college, even though they may have to go out and face some other issues. I would have to say, the emotional environment is positive. When using MySkillsTutor, my students are able to take pre-tests that are tailored to their specific grammar problem. By doing all of that prep work; taking them through an orientation and giving them their own password; it becomes their prescription for fixing their problem. I think it makes them feel more confident and more in control of the writing process and the steps that they need to achieve to become better writers. I try to set up a positive environment and tell them to not be afraid of the technology. My students do know that I can get on the technology and get a report of their activities. They're also accountable to how many times they use the program."

The emotional environment is different in my face-to-face classes than in the online classes. *Faculty that teach both online and face-to-face classes realize that the needs of their students are very different.* "We are on a very urban campus, and the environment is very different than say a four-year university**.** Many of my students do not admit to their family and friends that they're in college because of ridicule. It's sometimes the opposite of what you might think in that they're getting some ridicule for attending college. Many come from an environment where they may be the first to have graduated from high school or attend college. Some are very hesitant to telling other people what they're doing. My beginning face-to-face students, at least on this campus are hungrier to learn. Many are anxious to move out of the situations that they're in and do better. I think my online students just want to graduate. I want to graduate. I need a job. I have many responsibilities, and I need my piece of paper. In my online class, that's what they are there for. I was just uploading a PowerPoint presentation for my online class. They expect it. It's even a part of our SERS (student evaluation). In your online classes, the questionnaire asks did your instructor use audio, video, and take advantage of the technology that is available. If not, they'll tell you, no she didn't use what was available. There are some students that are hungry for technology. They have the motivation and a big support system."

A 'GOTO' person, besides me. *Help from other students in the classroom builds the student's confidence with technology.* "I usually team them up with somebody that has a little more experience. Some of them have never even been on a computer. We just go to the computer lab, and build on what they do know; and if they don't know anything, then we'll work on that. As far as the emotional environment is concerned, I think that once they get in there, I usually have teamed them up with someone that has had a little more experience with technology. Right at the beginning of class, I ask how many of you have had prior experiences with computers or technology. Maybe out of 15 of them, 4 or 5 of them will raise their hand. So I team them up. I tell them that this will be your go-to person besides me, whenever we are in the lab and you're working on something and you're stuck. I think that lets them feel more secure and you can see their confidence build as they get use to the technology."

Physical Environment

The researcher described the physical environment as the physical classroom layout (design, comfort) and enough learning tools (computers and software) for each class member during the individual interview protocol with faculty. The respondents were asked to tell more about the physical environment in their classrooms as it relates to technology use.

Maybe we're not as technologically advanced as we claim to be. *Some faculty feel that having to schedule a room or equipment to use technology hinders the use of it*. "I do feel like the physical environment is a major hindrance here at Campus C. They're in uncomfortable furniture. The layout of the tables is not ideal. I know we can bring the laptops into the classroom, but I would like to see all of the classrooms converted to SMART classrooms / labs. It would be better to have rooms where they have access to computers, but they can also put them aside so that we can do our writing assignments. I would like to see the physical environment of our classrooms at Campus C improve, but I understand that I'll have to wait for the renovations. Hopefully the renovations will solve some of these things; but when we have students meeting every day in a classroom that is thirty years old and out-dated, it's difficult to use technology. Sometimes, I have to drag or borrow a projector from another room. I mean we were voted the most wired community college campus in the nation. I really think that we should have better access to technology in the classroom. I have one class in a smart classroom. The rest of my classes have chalk boards. When I want to use technology for writing, we go to the learning lab."

We decided that it should have the computer lab somewhat separate; it's in the same room physically. *Having the ability to move the chairs and classroom around and still have access to computer technology has been an advantage.* "Both sides of the classroom have tables. If someone doesn't want to work at a computer, they can work at the table. I do give some choice in my lab where every objective has a computer choice and book choice. Some of them choose the computers for certain things that don't seem to be as easily accomplished in the book. The classroom also has small tables that can be rearranged. They have chairs with wheels. Our physical environment on our campus is adequate. I have them move their desks around. They have individual small desks and chairs and it's easy to move those things around. I like to use groups in the classroom and it's important to be able to change around the configuration. It's adequate from that standpoint. Occasionally, I'll use those laptops in the carts. There are about twenty-five of them. If the class is not overfull, that's usually enough. Typically, that's enough. I think this fall term they were all maxed out at twenty-five students."

Well on this campus we have access to just about any type of technology that we want to add. *Some faculty feel that FCCJ has an abundance of technology resources.* "Every classroom on our campus has the SMART classroom set-up for the instructor. They have the ELMO projector, the ability to do VCRs and DVDs. We also have a big lab here and I teach two of my four classes in the lab. I couldn't ask for more. As a matter of fact, I wouldn't know what to do with more. We have several labs that have at least 25 to 30 student stations. Many can get on the computers and type their own papers and work with learning objects. Then we have SMART classrooms where they're in traditional seats or tables but I control the screen which will show them anything from DVD's to learning objects that are available through the Internet. We all see it on one big screen. What I do is schedule time in those SMART classrooms. This campus is the only one that I've had experience with, but there's just so much available to us."

I've used three different classrooms here at Campus A, and I think the layout is not very well done. *The physical layout of the SMART classroom makes a difference in the ability and ease of teaching.* "In one classroom there are two rows of computers spread out in the classroom. Everyone can see the screen, but everyone can not see the boards in the classroom. And when I'm teaching, I have to keep turning my head back and forth like a tennis match. The way that they've used the space in that particular room to spread it out so far is very inconvenient. The second classroom is better. The instructor's desk is in the front and kind of off to the side. I don't have to keep turning to each side of the room, but again it is difficult to see the white boards. If I'm using the white boards, again it's difficult to see. In the third classroom, the technology has just been set-up in there, and I don't know how it's going to work. It seems like the same kind of layout that's in the first one. As far as the SMART classrooms are concerned, I wrote the comment about having the computer monitors underneath the desks. I prefer not seeing a bunch of boxes and being able to see my student's faces."

I think it's important to have the technology available. *One faculty member is lucky enough to have a computer lab adjacent to her office.* "It's become quite a convenience for me and my students. I haven't taught in a regular classroom in four years, just the computer lab. I request the adjacent computer classroom each semester. All of my classes are held there so that I have the ability to float in and out of the lab and my office. When the lab's not being used, I allow the students to come and use it. It has the computers impeded in the desks, so the tops are clear. When I'm doing projection of lecture material or PowerPoint or whatever, they have the whole desktop. Just recently, staff members were in the lab, rethinking how they would redo some things in that lab and what is the best way to organize that room."

Campus D is really wired. *Some campuses offer more technology resources to faculty than others.* "There's a lot more technology available to us at Campus D. I did teach at Campus D as an adjunct. Here, I've been in one SMART classroom. But most of our classrooms here at Campus C are not SMART classrooms. It's easy for me to use the labs here. I've never had a problem of being able to use the labs here. I don't think we

have the same type of technology available to us that we have at Campus D. I teach in a different classroom and every classroom has been different. Some of my classrooms have computers, and some of them don't; however I can request a laptop, DVD, projector or whatever I need from the library."

I'd like to have a complete set of computers and have that as my teaching room. *Most faculty prefer an assigned SMART classroom with computers.* "My classroom is very comfortable. This semester I teach in three different classrooms. We've moved from the desk to the tables and I like that. It changes the atmosphere and makes the students feel like they're in college. The lighting is good. And now that they have the computer set-up with the Elmo projector that's good because as I'm teaching I like variety. I don't have any problems with the physical setting itself. I prefer to have computers in that classroom. I don't want to have to bring my students out to the lab to use computers. I only have one of my classes in the computer lab. The others don't have the SMART classroom set-up. I try to reserve the computer lab in the library on certain days. I would love to use My ACCESS with them in a computer classroom. I think they could really benefit from that. I want to take them to the computer lab as much as possible. It's convenient to have computers all of the time. I'm flexible. I do a lot of cooperative learning activities, and discussions and can reserve the lab whenever I need to. There is a lot for me to do in the classroom without computers. I think computers enhance what we do. I'm certainly open to any kind of enhancement tool."

Acclimation

The researcher described acclimation as the process of becoming adjusted to a new classroom environment or situation as it relates to technology for both faculty and students. The respondents were asked to tell more about acclimation in their classrooms as it related to technology use and the adoption of new technologies in instructional design. The software that we were offering faculty the opportunity to integrate the following semester was My ACCESS, an instructional writing tool that grades student's papers holistically and analytically. It also offers faculty and students online assessment and can be accessed from the Web using a username and password 24 hours a day 7 days a week.

There's always a little bit of, well I don't know if I can do this, but most of them feel confident about it. *If the professors are confident about using technology, then the students feel more confident about using technology also.* "My students seem to enjoy the technology, but they want specific direction. They like it. Sometimes you do something new. For example we may do discussion boards in WebCT and have some of the students put some of their writing in the discussion board for us to discuss. They love that. There is some frustration that goes back to the student that is not very technologically minded and you just have to be very, very patient. Some people are just not as comfortable with a computer. At the beginning of the semester, I can easily identify those that really don't know what to do with the computer. They're afraid of the computer. They are hesitant at the beginning. I make sure that they have enough support from me and other students that have learned already. I make sure that they are not too traumatized to adjust, in terms of the mechanics of things. I haven't seen that I can just let them do it alone without looking over their shoulders. You have to let them know that the machine will not break, and they must be willing to try it. Ultimately, it's designed to help us."

One thing I have to be careful of is that students come on campus because they come for face-to-face instruction. *Many students enroll in face-to-face classes because they want face-to-face instruction and not online.* "That doesn't mean they don't want technology components in their instruction, just not all components online. They do not want on-line. If you introduce too many on-line components using technology then they get very frustrated because that's not what they really want. They want to be in a face-to-face environment with other students. To say to these students; I'm going to put you into this program and let you work by yourself is not what these students want. If they like that, then they're online students. I try to give my students options. For example in writing papers, they can go online and get help from the handbook, or go to the tutors in the learning center, or they can contact me for additional help. The ones that like the computer will use the online handbook and the ones that want more one-on-one will go to the tutors in the learning center. I do think there's a level of frustration with some students and we have to be aware of that."

Many things can happen in an online environment. *Getting students used to an on-line environment can be challenging for both faculty and students.* "I use the Blackboard shell. My most successful online student is the student who works independently. In online many things can happen to a student. They may access the wrong computer assignment or quiz or their computer may crash. You can't always become absorbed in one student when you have 22 other online students to worry about. But that doesn't change the frustration level of that student. I think it makes it worst. I try NOT to tell them that no one else is having problems because I know that makes them feel even worse. Very few of my online students are taking their first online class. I tend to teach my online courses for second year students. None of them are first time in college."

Some professors are afraid of technology. *Some faculty are afraid of the intricacies of technology and want more technical support to help.* "There are some professors who are somewhat reluctant to do very much with technology, because they're afraid it won't work. Most of our Professors want to concentrate on their subject matter and not the technology. For example, one of our faculty members published a book which comes with an online handbook and the publisher sent someone to her classes to assist her teaching her students to use it."

I like experimenting with technology. *Some faculty feel it's best to embrace technology, learn as much as you can so that they can be there for their students.* "For me, it's easy to get acclimated. I don't have any fears of it and I realize the value that it has and how this generation of students that we're dealing with came up with this 'instant generation' where a lot of them are accustomed to that fast pace stuff. So you have to embrace it and learn as much as you can about it in order to be effective in your classroom. I prefer computer programs with the visuals, not just because they're visual. The learning modules are set up better than the ones without the visuals. I think to a certain extent, the extra visuals are good, but if it goes too far, it distracts them. It becomes more like entertainment than education."

Well I like the students to be open-minded as far as the teaching methods are concerned. *Faculty like to use mixed methods of presentations to keep the classroom activities interesting.* "I mix it up and use lecture and student presentations. I try to give them enough warning at the beginning of the term of what will be going on. I let them know that this is what they can expect as college students. It does take some time for them to find themselves at the beginning of the semester. It takes someone in my position to recognize that and to give them the time to find themselves. It's necessary to let them have that extra time. I had the PowerPoint machine in there today. I use CD's to reinforce certain concepts. I also spend class time orienting the students to the program. We sit down one-on-one and look at WebCT or whatever program we may be using. They can ask me any questions that they have. We go through it step by step. And then, I'd like them to go and try to explore that, ideally. I do have activities. I do give them instructions on how to access the program and let them know that they have access to it 24 hours a day, seven days a week. If it's new to them, a few of the people might have trouble getting in. They may not be following the directions. Then I'll clarify and say that they can type this in that space or this one, etc. So once they get into the program, they don't really have a problem. It's just trying to initially get in. The initial getting in and the anxiety of not knowing what the program will entail. They get through it. MySkillsTutor is a grammar program that I have them use. Once they have their initial log on passwords and their User-id, they can do this program from any computer. I find that a lot of them when they've done some of it at home and then they come into the lab, they're more comfortable."

Technology is all around them, and I don't want them to be scared of technology. *In our current society, faculty feel that a knowledge of how to integrate technology into school and work is needed.* "I want them to start not necessarily to embrace it, but to use it to their advantage. I feel like they're my students, and they're here to learn not just

what they need to get out of my class, but to get that extra push so that they will want to continue to go to college. I want them to become lifelong learners. I feel like that's my ultimate goal. I'd like to see my students succeed. When we got the new class with the bright colors and new computers they were very excited. I encourage my students to embrace technology. Not everybody wants to continue using it, but they understand that in order to survive in today's world they need to know technological ways of doing things."

Well I think the most important factor with acclimation is just time. *Increasing the use of technology over time helps faculty acclimate towards it.* "Time to practice, time to use the programs or technology, and also plenty of feedback while using it; having access to other people that know how to use it, like me and other technology support persons. It's important to have access to other people that know more and can answer questions that I can not. To me the key to acclimating is just practice. Just use the programs. Having access to a manual can be important. Some people would benefit from reading that. College level students do fine to acclimating to technology. I do this one lesson, where instead of me teaching fallacies, I have them teach me. I give them a group assignment and allow them to present to the class. They come in with these wonderful PowerPoint presentations. They just do a wonderful job of it. It's like; they know more about technology than I know; to come in and do these presentations in a wonderful way. They're great at it. When you go down to a lower level like College Prep. That's when your students have more problems with technology. You have the older returning student and they have a harder time with it. And some of them catch on fine, and others are just a little bit slow at it."

What I've found is that acclimation is somewhat of a team effort. *Making acclimation a team effort between the professor and student and the student and other students helps everyone.* "I find that students really enjoy peer interaction with one helping the other. I explain to them that I need their help. There are more of them than me and I need their help. They're always happy to do that. I sit with them individually. I have them come to my office. I mean I will do whatever I am capable of doing as one person to help them. If you sit with people who aren't comfortable, it makes it easier for them to acclimate. Some students have a weariness of new technology. Yes; many developmental students that aren't computer savvy are very leery of computers in general. In some cases they may feel that something's going to blow up. They're very uncomfortable at the beginning. They feel that something's going to happen. At the beginning, they may be very uncomfortable. But what I find is that those that have had the least amount of training, by the end of the term, they are the most excited because they've learned so much. If I have students in the class that feel uncomfortable, then I've been fortunate in that other students in the class have sort of stepped in. I find that works very well, because they're not intimidated by the instructor showing them how to do it, but by their colleagues helping them. It's not something that I had planned, but it works well."

My students and I love the learning center. *When faculty and students make use of the learning center it can beneficial to both.* "Well, my basic experience is with Word Processing software. The tutors help me in getting them ready to use Microsoft Word. About the second time we use it, they seem to catch on to double spacing and other aspects of the tool. I would say that it's a pretty positive experience. I have the Library and the Learning Center do an orientation for all my students at the beginning of each semester. If their computer skills are not up to par, then I make use of programs that they can access from home. We were in the Learning Center just the other day, and almost every one of them I had to sit with. But then, again, it's a good thing for me. Then I knew where my students were and that I would have to fine-tune what I assigned to them to make sure that they knew how to do it. I spend a lot of one-on-one time with them. I can recall two older students that came in to work with me. Sometimes, I allow the tutors in the Learning Lab to work with them, but usually I have to spend time in class and one-on-one working with them. I find that hands-on teaching really helps a lot."

Interview Protocol (Part 2 Theoretical)

The second half of the individual faculty interview is the theoretical interview. Its purpose is designed to identify relationships between affinities. The graphical representation is presented in an Affinity Relationship Table (ART) which allows respondents to follow each paired relationship. Each respondent was presented with a copy of the ART and asked if they believed there was a relationship. In the possible pairs for the affinities there are three possibilities: For any two affinities A and B, either:

A $\rightarrow$ B (A influences B)
A $\leftarrow$ B (B influences A)
A <> B (No relationship).

In the interview, the respondent was asked to determine if affinity A influenced B, by using a right arrow, or B influenced A, by drawing a left arrow, or if they believed there was no relationship (by using the no relationship sign).

Affinity Name
1. Emotional Environment 2. Physical Environment 3. Acclimation 4. Classroom Activity 5. Instructor Interaction

Possible Relationships
A → B A ← B A <> B (No Relationship**)**

Interview Affinity Relationship Table (ART)					
Affinity Pair Relationship			**Affinity Pair Relationship**		**Affinity Pair Relationship**
1	2				
1	3				
1	4				
1	5				
2	3				
2	4				
2	5				
3	4				
3	5				
4	5				

Figure 16: Faculty Interview Affinity Relationship Table

Theoretical Code Frequency Table

The procedure described above to identify relationships is also used for combining theoretical data including creating a count of each theoretical code and entering it into the combined communications faculty theoretical ART displayed in figure 17. The researcher counted the number of respondents who identified relationships in the

same direction and placed the tally in the frequency column. The same procedure was followed for the relationships in the opposite direction. The combined communications Theoretical Code Frequency table is listed below.

Communications Faculty Composite Interview Theoretical Code Frequency Table			
Affinity Pair Relationship	**Frequency**	**Affinity Pair Relationship**	**Frequency**
1 → 2	11	2 → 4	10
1 ← 2	10	2 ← 4	11
1 → 3	16	2 → 5	6
1 ← 3	4	2 ← 5	14
1 → 4	8	3 → 4	4
1 ← 4	13	3 ← 4	16
1 → 5	3	3 → 5	2
1 ← 5	17	3 ← 5	19
2 → 3	13	4 → 5	3
2 ← 3	7	4 ← 5	18

Figure 17: Communications Faculty Composite Theoretical Frequency

Pareto Protocol

The results of the frequency tabulations were recorded in a Pareto Table. The Pareto Table is named for a nineteenth-century economist Wilfredo Pareto. It was later popularized among systems theorists by Joseph Juran (1988). The Pareto Principle states that 20% of the variables in a system will amount for 80% of the total variation in outcomes (Northcutt & McCoy, 2004, p. 156). In calculating the final SID analysis, creating the Pareto Composite Table for the system required an exact count of

relationship codes. The Pareto Table has distinct benefits in that it takes into account close votes and identifies conflicting relationships not addressed in a simple vote. In an Excel spreadsheet, the frequency of each relationship was calculated, and the relationships were sorted in descending order. Cumulative frequencies were calculated for two purposes: 1) to determine the optimal number of relationships to comprise the composite system and 2) to resolve ambiguous relationships (Northcutt & McCoy, 2004, p 157). The final Pareto Composite Table determines which affinity pair relationships should be used in the final system. The Pareto Composite Table for the communications faculty's composite SID is listed below.

Affinities in Descending Order of Frequency With Pareto and Power Analysis

Affinity Pair Relationship	Frequency Sorted (Descending)	Cumulative Frequency	Cumulative Percent (Relation)	Cumulative Percent (Frequency)	Power
1 > 2	11	11	5.0	5.6	0.6
1 < 2	10	21	10.0	10.7	0.7
1 > 3	16	37	15.0	18.9	3.9
1 < 3	4	41	20.0	20.9	0.9
1 > 4	8	49	25.0	25.0	0.0
1 < 4	13	62	30.0	31.6	1.6
1 > 5	3	65	35.0	33.2	-1.8
1 < 5	17	82	40.0	41.8	1.8
2 > 3	13	95	45.0	48.5	3.5
2 < 3	7	102	50.0	52.0	2.0
2 > 4	10	112	55.0	57.1	2.1
2 < 4	11	123	60.0	62.8	2.8
2 > 5	6	129	65.0	65.8	0.8

2 < 5	14	143	70.0	73.0	3.0
3 > 4	5	148	75.0	75.5	0.5
3 < 4	16	164	80.0	83.7	3.7
3 > 5	2	166	85.0	84.7	-0.3
3 < 5	19	185	90.0	94.4	4.4
4 > 5	3	188	95.0	95.9	0.9
4 < 5	8	196	100.0	100.0	0.0
Total Frequency	**196**	Equal Total Frequency	Equals 100%	Equals 100%	Power = E-D

Figure 18: Affinities in Descending Order of Frequency

The IRD

Creating an Interrelationship Diagram (IRD) is generally the first step in the process of *rationalizing a system*. The output of the Pareto Protocol is summarized in an IRD: a matrix containing all the possible relationships in the system. The IRD arrows show whether each paired affinity can be perceived as a *cause* or an *effect*; or if there is *no relationship* between the affinity pair. The combined communications faculty IRD sorted in delta order is listed below.

Communications Faculty
Affinity Tabular IRD

Affinity Name
1. Emotional Environment
2. Physical Environment
3. Acclimation
4. Classroom Activity
5. Instructor Interaction

Composite Communications Faculty Tabular IRD								
	1	**2**	**3**	**4**	**5**	**OUT**	**IN**	**Δ**
1		↑	↑	←	←	2	2	0
2	←		↑	←	←	1	3	-2
3	←	←		←	←	0	4	-4
4	↑	↑	↑		←	3	1	2
5	↑	↑	↑	↑		4	0	4

Count the number of up arrows (↑) or *Outs*
Count the number of left arrows (←) or *Ins*
Subtract the number of *Ins* from the *Outs*
to determine the (Δ) *Deltas*
Δ = Out- In

Figure 19: The Communications Composite IRD

Composite Communications Faculty Tabular IRD – Sorted in Descending Order of Δ								
	1	**2**	**3**	**4**	**5**	**OUT**	**IN**	**Δ**
5	↑	↑	↑	↑		4	0	4
4	↑	↑	↑		←	3	1	2
1		↑	↑	←	←	2	2	0
2	←		↑	←	←	1	3	-2
3	←	←		←	←	0	4	-4

The value of delta is used as a relative marker for the affinity positions before and after the table is sorted. Affinities that have a positive delta are relative drivers or causes; those with negative deltas are relative effects or outcomes. The tentative SID assignments table contains the order or placement of affinities for the SID.

Communications Faculty Tentative SID Assignments	
5	Primary Driver
4	Secondary Driver
1	Circulator / Pivot /
2	Secondary Outcome
3	Primary Outcome

System Influence Diagram (SID)

The System Influence Diagram (SID) is a pictorial representation of the entire system of affinities, influences, and outcomes. In creating the SID, all affinities are ordered according to the tentative SID assignments chart. This can be created with a software program called Inspiration. In creating the SID, the researcher placed the affinities on the screen by topological zones: Primary Drivers to Primary Outcome with Secondary Drivers and Secondary Outcomes in between. Each system is placed in an oval circle. The researcher drew arrows to connect each affinity in the direction of the relationship as represented in the sorted IRD.

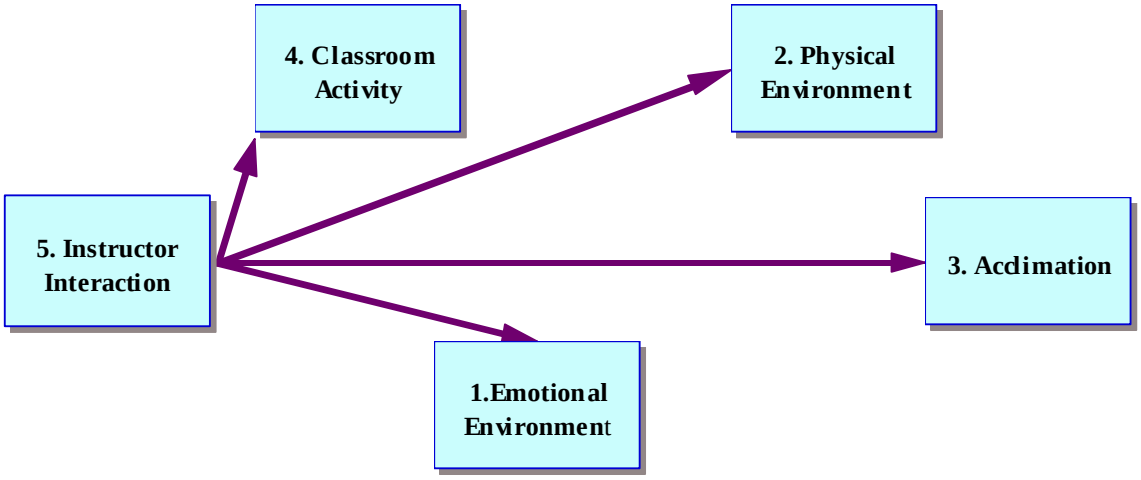
Cluttered SIDs

The first iteration of the SID that contains all links present in the IRD is referred to as Cluttered. Removing redundant links produces an Uncluttered SID that is much more straightforward, yet is consistent with the final theoretical relationships produced in the IRD.

Composite Theoretical Descriptions

The researcher examined all quotes for each separate affinity pair relationships and they were woven together in a composite table of quotes with interview number, theoretical codes, and quotes. The next section contains the composite quotes obtained from the transcripts of all of the faculty interviews along with a SID with the primary drivers, secondary drivers, secondary outcomes, and outcomes.

Instructor Interaction Influences…



Classroom Activity **"**I think the instructor is going to be the main enforcer of any classroom activity. So I would have to go with instructor interaction. My interaction is very important within their groups. They're doing most of the work, but I'm guiding and facilitating. Instructor interaction is stronger. The teacher needs to know their role and set their role in the classroom. I need to know how much involvement that I want to take part in an activity. Do I want to get in there and talk about it, or do I want them to talk amongst themselves to see where they will go with this particular topic. The teacher interaction has a large part in the activities. We can make them either work or fail through our interactions with them."

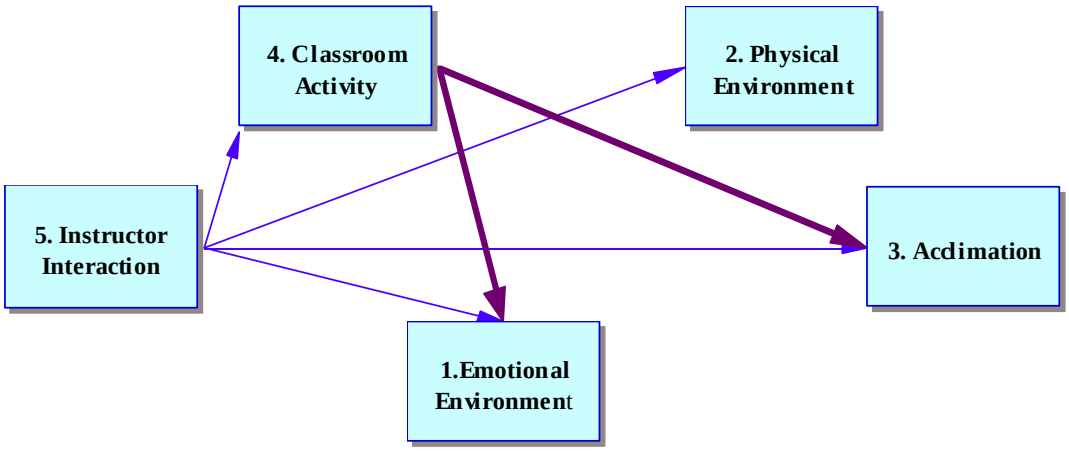
Emotional Environment "The way the instructor relates to students is most important. The instructor interaction *is* what makes the emotional environment. I'd like to think that as an instructor I would be able to control / overcome the emotional. Emotional is important. But again, I'm the facilitator and have more control over the interaction and the activity. That's my job. In the emotional, I set the tone. The instructor interaction causes the emotional reactions. Boy that depends on whether I'm having a good day or a bad day. On a bad day, their emotional state definitely affects me. On a bad day, if I'm not reaching them, it's harder for me to make myself reach them. I'm going to break through that, just as the classroom activities can break through that. Sitting here in front of you trying to portray myself as the ideal teacher, I'm going to say the instructor interaction impacts the emotional environment. The instructor interaction is stronger. If

you've got a lousy emotional environment, then you've got a lousy instructor. That's a bold statement. But if a student is not doing well, then I feel the instructor must shoulder most of that. I track mine down. If I've got someone that misses two classes, I'm emailing and calling to find out what's wrong. What's changed since our first day of class together? It's this whole thing that somebody really cares if I succeed, or if I don't."

Physical Environment **"**That's an interesting one. Probably the instructor interaction to the physical. If I don't like the physical layout of the classroom, then I can change it. I've been to some classrooms where you could hang meat in them. Students are not gong to learn if they are too hot or too cold, but that can be changed. I think the instructor interaction impacts more. I think you can teach just about anywhere. When you go back in history we didn't have much and students learned a lot more. Again there is a mutual relationship between the physical environment and the instructor interaction, but the interaction that I want to create will help to share that space. The instructor interaction is stronger. Once again, the instructor interaction is more important. You can arrange a classroom in the traditional lined up rows. Some professional will line them up according to what they think will serve their purpose the most. The physical environment can always be changed to what the instructor wants it to be."

Acclimation **"**Ideally, the Instructor interaction has the greater impact on acclimation. That may not always be the case, but that's the way it's supposed to be, or the way it should be. I think instructor interaction is the strongest. Setting up the class is important. If the instructor does a good job of setting up the class and creating the environment, acclimation will come with that. Instructor interaction is what shapes the acclimation. Instructor interaction with the students is greater. You've go to have a lot of interaction with your students. I'm going to have to plan the activities so that they can become acclimated."

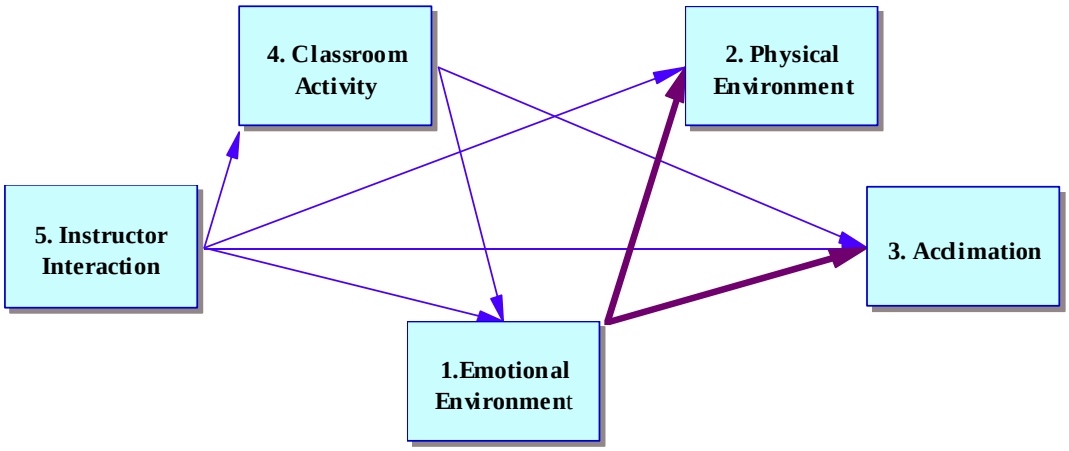
Classroom Activity Influences…



Emotional Environment **"**I would say that a well structured classroom activity can take care of emotional problems. To me, the emotional is almost a given after the first day of class. I think they're pretty intertwined. I think where they are emotionally is going to affect how they do on the classroom activity. But I think the classroom activity overcomes any negative emotions. The way I teach, I would have to come down on the side of the classroom activity. Based on my teaching style. I think the classroom activity has a greater impact on what the student does and learns. But, I think the teacher has to create the emotional environment that allows them to do it. I guess the activity is more important. The classroom activity. You can really get them wound up. One class on yesterday, my 8:00 o'clock. They're always so noisy. Usually, your 8:00 o'clock class comes in and they're still asleep. They're a fine class, but they're always talking. I gave them a group activity on yesterday and they were so quiet. I said to them, this is the first time you all have been quiet. It's time to talk. The classroom activity may be a little stronger. The classroom activity may dictate what the emotional environment will be; depending on what activity you're doing that day. If somebody feels threatened by a particular activity, then that could affect your emotional environment. The classroom activity would have a stronger relationship because what the instructor does pedagogically can impact the emotional environment of the classroom."

Acclimation **"**With the classroom activities we make, we build a community classroom. On the first day of class, you have them introduce themselves, or better yet, have them introduce their neighbor. I tell my students that you're going to need to know everybody in here. You're going to see them again. The classroom activity will help to build the learning community. They help to build the course and the outcomes and achievements in the course. I think the classroom activity is stronger. I think the classroom activities planned would go a long way in getting the students more acclimated."

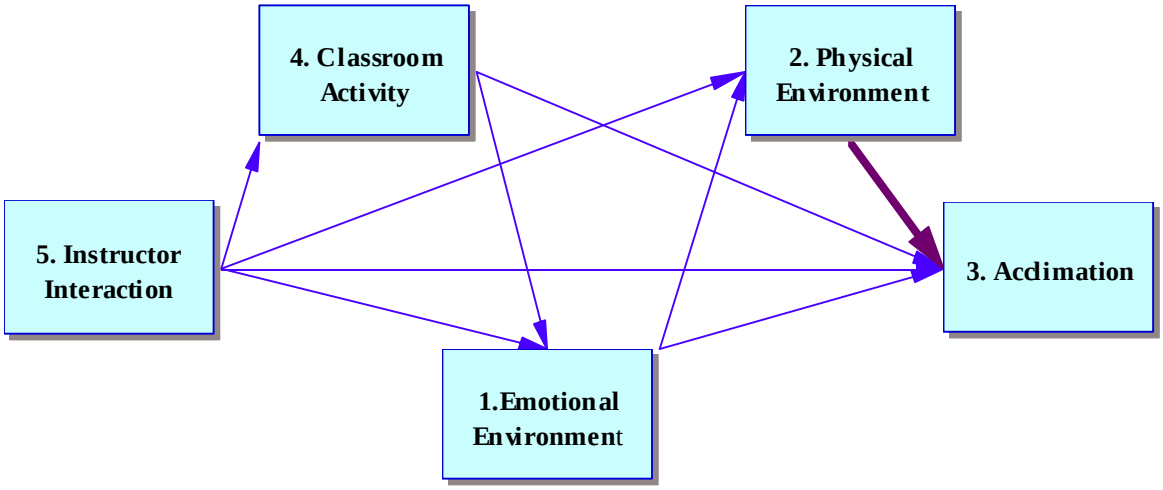
Emotional Environment Influences…



Physical Environment **"**I think that the emotional is probably the thing that's most important to me. I think in many cases I can overcome the physical environment. If someone is not emotionally comfortable either in your class, or with technology, then they're not going to function. If they're not comfortable then they're not going to use it. Physically, if they're not comfortable, then they're not going to use it. I think the emotional would affect the physical more. The mindset is harder to change. I think the emotional environment has a greater impact. If the students are o.k. emotionally, then they'll be o.k. in any physical environment. I definitely think the emotional environment. As far as the physical environment is concerned, if you've got a good teacher, then they can teach anywhere. The teacher is the facilitator. They can teach under any circumstances. War times have taught us that. You've got to have a good facilitator that creates a safe, comfortable environment where students feel safe. The emotional environment has to be set up. You can have the prettiest room set-up in the world, but it's not going to translate to your students."

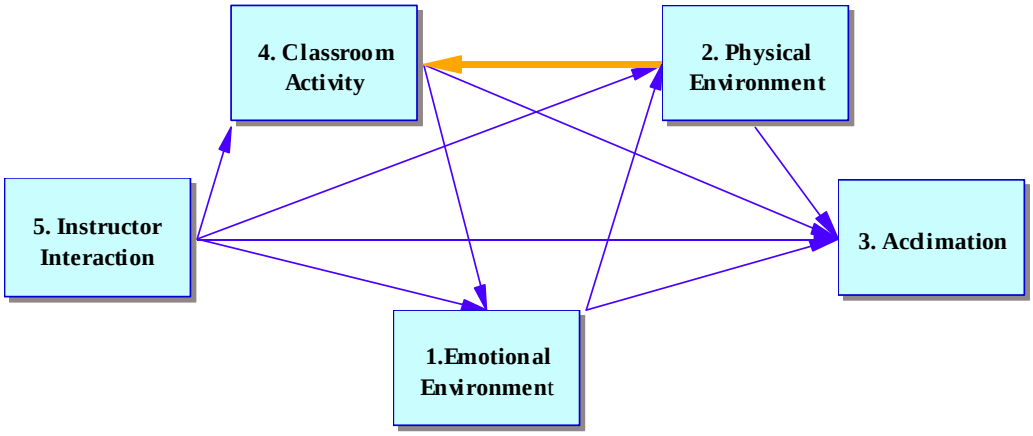
Acclimation **"**If the students are prepared for it, then they'll do it. It all has to do with the students and their attitudes. Unless something doesn't work, the emotional would have the greater impact. If you prepare them emotionally, they can do it. I think the emotional effects the acclimation again. I realize that if I read my SERS, which are our evaluations that my students know that I want them to do well. They say to me that if we didn't come, we know that would upset you. I think that's what keeps me working here. One of my students had been out a lot this semester and she wrote me this beautiful letter that stated that she had made some bad choices at the beginning of the semester, but that she was still in school because of me. And that she was going to do better the rest of the semester. She stated that these choices were going to change now. I find that over and over that the emotional connections that you make with you students help with your developmental classes. I'm not sure in the traditional classes that it's quite as important. With traditional students, they've started and are used to school. With developmental students, they are very tender, this is their first semester and possibly their first time here. Even with something like technology, you really have to go that extra mile to help them feel comfortable about it, or it's not going to happen. Students are not going to be willing to try something new if they don't feel that it's safe to do that. So the emotional environment impacts the acclimation. It's definitely the emotional. We need to figure out why students came to us. Why are they here? The emotional probably impacts the acclimation more. Where they are when they come in is probably going to affect where they're able to go once they get there. I guess that's the best way that I can put it. If you have a class that's emotionally comfortable, then they're going to trust what you're doing. Again I think that comfort zone is the most important; the emotional. I think the emotional effects the acclimation. If we are open to the students, then they're more apt to accept it and be well acclimated. Emotional environment creates the space for students to become acclimated. The emotional environment would be stronger. Emotional effects acclimation. Unless students are in an environment that is emotionally stable and have some confidence in what they are doing, it could affect acclimation. I think fear and their economical background also have a direct impact on acclimation. Unless you give technology a purpose to it, they're not going to catch onto it. If it doesn't serve me a purpose, why should I catch on to it? If they see that we can accomplish something with this machine, whether it's research, class-work, or emailing someone; then they'll use it. Once again, I think the emotional impact is stronger. The emotional, I think will always be greater because I'm always most interested in how my students are. I'm conscience of how they're responding and whether they feel empowered. The emotional level of the student has a lot to do with how well they will acclimate to something."

Physical Environment Influences…



Acclimation " I think the physical environment has a big impact on the acclimation. I would have to say the physical environment because if they are comfortable in their physical environment, then they'll get accustomed to what we're doing faster. It's not going to be on their mind to get accustomed to what we are doing if they're uncomfortable. It all comes back to creating a safe physical and emotional environment for them to learn. An example would be if you were in the classroom trying to introduce something and did not have the right equipment, like a projector. The physical would have a larger impact. Another example might be if you were in a classroom teaching the students about searching and did not have access to computers. I think the physical environment affects the acclimation. You have to be very careful and keep an eye on them. The computers are here to enhance their learning and you don't want them surfing and shopping on eBay during instructional time. It doesn't happen often, but still you want to watch out for it. I think the physical environment affects the acclimation. For example, if I they can't use the computers, then they can't do the activities planned for acclimation."

Physical Environment Influences…



Classroom Activity (Feedback Loop) "Yeah, not having the physical environment is a disadvantage in many cases. I think the physical environment will affect the classroom activity. I think the physical has more impact, because in order to learn, you have to be comfortable. If you're a left-handed student and I have you sitting in a right-handed desk, then you will not be physically comfortable. Again, I think if the environment is wrong, no matter what task you give them, they're not going to do well. The physical environment does affect the classroom activity. I think the physical environment affects the classroom activity more because if you are in a computer lab, it's harder to move your chairs around. There are long tables here and I can move things around temporarily to set-up groups if I need to. You can see that they discuss things more if they're face-to-face rather than if each member of a group is down a row. Even if they get into a small circular group, I think they get better results. Yes, it's going to be the classroom activity with the greater impact. As soon as class begins you're on. You've got to be ready with those classroom activities. If we're not, then students should ask, why should I be ready for class today when you're not? Again, I think the physical environment can impact the classroom activity. Just like my COMP2 class and not having access to the computers. Again I guess if the room was really cold and there's not good lighting it would have to be the physical. It could go that way."

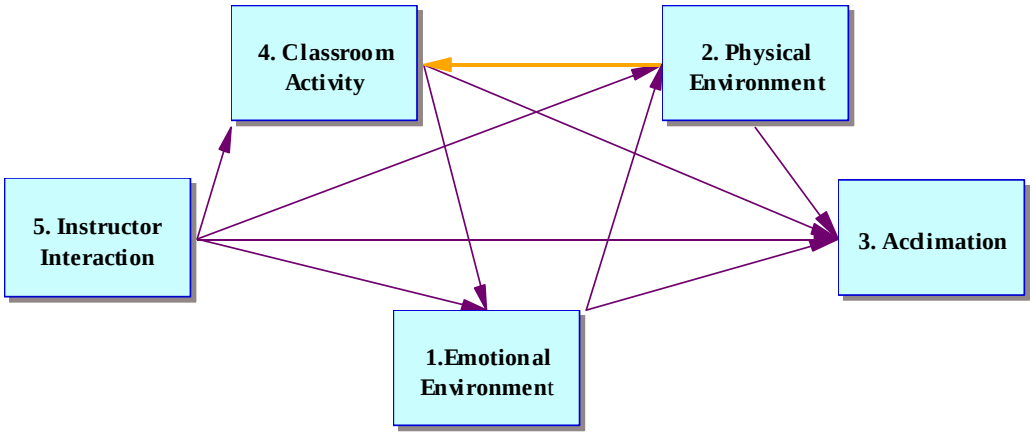
Feedback Loops

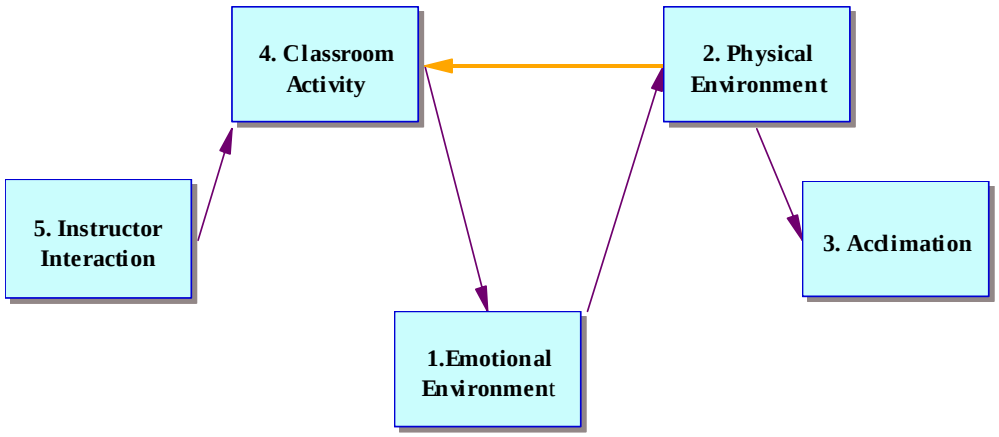
In the theoretical relationship between the physical environment and classroom activity there is a feedback loop. In a system, a feedback loop represents recursion or feedback; that is elements in the system that are (relative outcomes) or effects in the

system are feed back to or influence elements that appear earlier in the system (relative causes).

Communications Composite Cluttered SID

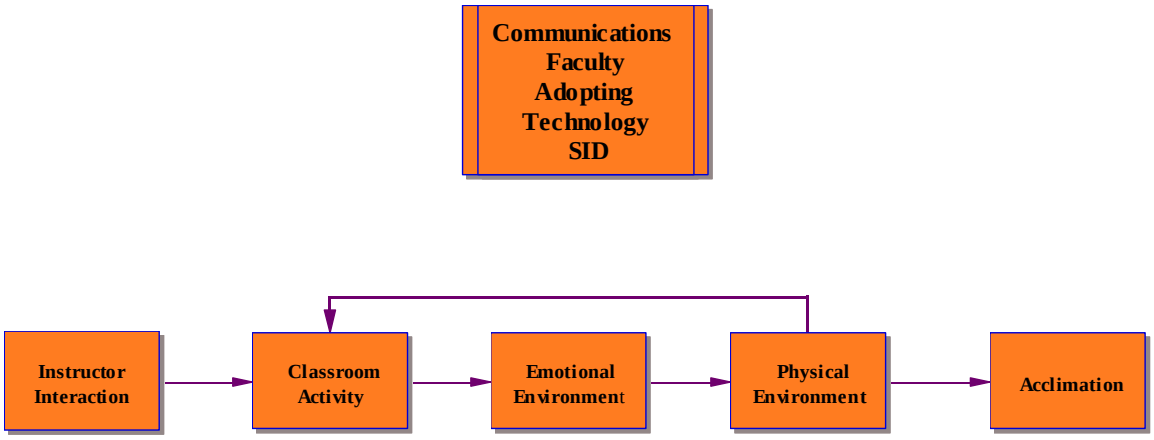
The cluttered SID contains all the relationships described by the group (21 faculty interviews). It's said to be saturated with relationships. The redundant links are removed to produced an Uncluttered SID.





Communications Composite Uncluttered SID

The composite communications Uncluttered SID that will be used throughout the study is listed below.



"Instructional technologies greatest challenge is not developing effective products, but developing effective products that people want to use" (Surry, 1997, pp 12-15).

Chapter 5

The System Speaks: An Interpretation

The purpose of this study was to gather the perceptions of faculty in focus groups and individual interviews as they adopt new technology over time. My ACCESS, a Web based instructional writing tool was introduced to faculty during the course of the four month study. Full-time communications faculty that teach writing in their courses (Reading, English, Developmental, Adult Basic Education, and GED) at FCCJ were included in the study. As a result of this research, faculty perceptions of adopting new technology can be better understood to help support them in the process.

A qualitative approach was used to capture the faculty perceptions of adopting new technology. The qualitative methodology allowed the researcher to capture more depth and detail and the range of experiences from the participants involved (Patton, 2002). The researcher used Interactive Qualitative Analysis (IQA), a qualitative technique engaging participants in focus groups and individual interviews to ground the data. This research design provided rich contextual data about faculty perceptions of adopting new technology by creating affinities or themes to address the issues.

Summary of the Findings

The major findings of the study are reported within the context of the research questions outlined in this study and in analysis of the Communications Composite System developed from the IQA process and the overall placement of the affinities within the system and the relationships between them. The research questions outlined in this study included:

1. What are faculty perceptions of adopting new technologies like My ACCESS as a tool to improve the writing of community college students?
2. What motivates faculty to adopt and integrate new technology into their courses and instructional design?
3. How can administrators support faculty in the adoption of new technology in instructional design?

In regards to research question one – the faculty perceptions of adopting new technologies like My ACCESS, the individual interviews revealed a number of themes and sub-themes; some mentioned in the composite system affinities and others given further detail in the qualitative data from faculty. One reoccurring theme that faculty mentioned was an enthusiasm about technology use and sharing new technology with their students. If faculty want to use technology and have access to it, many will develop classroom activities that integrate the technology and the subject matter in classroom activities to enhance the students' learning. 'A love for the subject' was mentioned a number of times by faculty interviewed. If you have a love for what you are doing, then you will want to enhance it with new and creative tools, like My ACCESS. 'A love for the subject' is part of the motivation shown by faculty interviewed to find creative ways to introduce their subject to students. Many do not want to bore their students with traditional lecturing and prefer technology and cooperative learning activities to make their classes more interactive.

Building a rapport between student and faculty was mentioned as instrumental to student success, with both technology and learning. Faculty mentioned that establishing strong emotional relationships in the classroom made their students less resistant to new

approaches like My ACCESS and established trust and confidence in what they were doing in the classroom. Faculty suggested that establishing a relevancy factor between the new tool, My ACCESS and the needs of the student within the context of the subject matter was important to students. In other words, faculty must believe in the new tool. Does it work? Does it provide feedback or assessment for their students in their strengths or weaknesses? Does it reinforce a particular learning module that the student is having difficulty with? Finally, faculty want to feel comfortable with the technology in the classroom. The new technology should be easy to use and not present a large learning curve for faculty or students. During the two training sessions held with communications faculty, they felt that My ACCESS met these and other requirements. Their perception of the tool was positive during the training classes and many called the researcher after the training requesting faculty and student accounts to begin using it. Thirteen communications faculty attended the first My ACCESS training session and six attended the second training session of the twenty-one faculty interviewed. After the training session, each faculty member was given a My ACCESS training manual and a web account to continue practicing using the software.

Faculty motivation to adopt and integrate new technology, like My ACCESS can be internal or external. The internal motivation comes from the faculty member's feelings about new technology in the classroom. Is the faculty member a life-long learner that enjoys integrating new methods, including technology into their teaching and learning? Or would they prefer to continue to deliver their instruction the way they've always done it? About ninety percent of the faculty interviewed wanted to know more

about new technologies that could be integrated into their classrooms for their students. They believed that their students wanted new approaches to learning with more interactive technology in their classroom activities.

The external factors related to motivation and adoption including access and support. Some faculty that taught at older campuses, with less technology available to them in the assigned classroom, felt that they did not have the access to use the technology on a regular basis; therefore they had less motivation to learn to use it. Several participants mentioned that they only had access to chalk and boards and had to either schedule a lab or use the learning center in order to have computer access for their students. Some felt the availability of both the lab and learning center lab were restrictive due to the large number of class sessions held during the semester. Faculty that taught at newer campuses with mostly SMART classroom setups or taught in computer labs were more motivated to learn My ACCESS because they had a scheduled classroom to access it with their students. Although FCCJ is one of the most wired community colleges in the country, at least two of the campuses are about to undergo major renovations to enhance their classrooms with more technology access. Most faculty interviewed stated that they were aware of the renovations scheduled for two of their campuses and that they would take time to complete them.

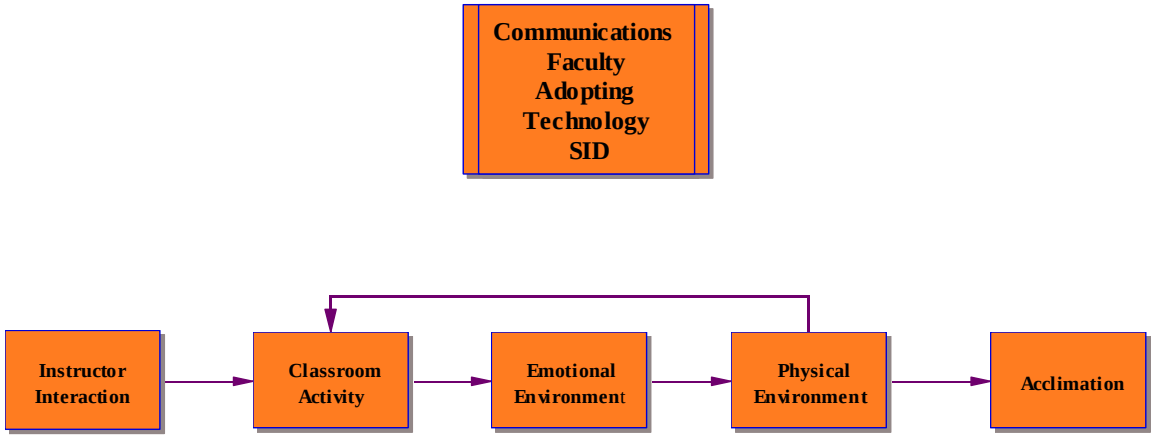
Support (training and professional development with the new tool, technical support from the vendor for user questions and/or problems, peer support, and support from the learning center) were mentioned during the training sessions and individual

interviews with faculty. Peer support from faculty comes from the opinions of others within the discipline about the new technology tool. At the My ACCESS training session, peer support for the new product seemed high. The learning center director and coordinator was mentioned in that many faculty felt they were excellent resources to use in learning about new technology for both faculty and students. Each semester the learning center holds classes for faculty. Most felt it would be great if the learning center would act as another resource for new faculty or later adopters of the new My ACCESS technology.

Administrators can support faculty in the adoption of new technology by providing: communications to faculty that a new tool is available, initial and on-going training and professional development with new technology, financial support for the product / project to ensure that the tool will remain available for use, and support for the campus technology infrastructure. Many faculty interviewed wanted some type of communications from administrators concerning the adoption and use of My ACCESS. They wanted to know if the administration supported the My ACCESS tool and vendor and if this new technology would be available for long-term use. As part of the administration's support for My ACCESS, they assisted the researcher in setting up an initial all-day training session with breakfast and lunch. A second training session was provided for participants who could not attend the first one. Answers concerning the products' long-term use, financial support for the tool, and improvements in two of the four campuses technology infrastructures would also be addressed by the administration.

Communications Composite System

Overall placement of the affinities in the system



The adoption of communications faculty of new technology is driven by instructor interaction. Faculty can impact students in establishing a rapport with students, showing enthusiasm for the subject, and showing the student how supportive they are. Faculty mentioned that hands-on teaching – spending time one-on-one with students and role playing shows their students their level of commitment to helping them succeed. Instructor interaction can affect the classroom activities assigned to students. Many faculty assign lots of integrated instructional technology assignments individually or in groups that allow them to act as leader, cheerleader, coach, or instructor with their students. Participants in the study mentioned that a well structured classroom activity can set the tone emotionally for learning and affect the emotional environment. They described the classroom activity as helping to build the learning community with

outcomes and achievements. When learning a new tool, particularly technology, there should be lots of reinforcement with classroom activities using the new tool. The emotional environment influences the physical environment in that if someone is emotionally uncomfortable in the class, or with the technology, then they're not going to use it. As suggested by one of the participants, "the mindset is harder to change". The physical can impact acclimation in that if the physical is not comfortable, then it will be difficult to learn. Also, not having the correct physical environment can affect classroom activities. For example, not having access to a piece of technology equipment or access to the Internet could affect access to a new technology and therefore prevent interactive classroom activities to learn from using it.

The Affinities

Instructor Interaction. Instructor interaction with students can have an enormous impact on students' interest in the subject matter and their participation in class. Faculty helping students with course content, or a technology issue helps by showing students that they have someone who's interested in their success. Participants mentioned that showing students that you care makes a tremendous difference in establishing a connection and keeping the student interested, particularly with developmental students.

Classroom Activity. Instructors that plan individual and group interactions in the classroom with some component of technology are paramount to learning and adopting new technologies. "I'm trying to find individual and cooperative activities that make the

computer become an extra partner in their learning" is the way one of the research participants described classroom activities. Hands on experience is needed to remember how to use technology effectively. "They need the hands on. I have discovered that for the most part, they have got to do it to remember it" was mentioned by one respondent.

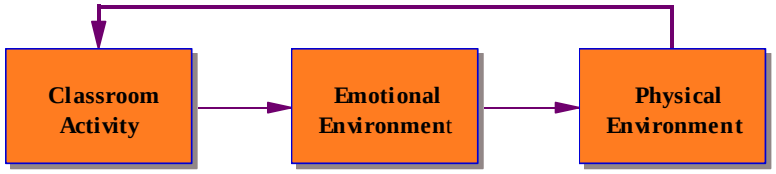
Emotional Environment. A positive emotional environment where students feel comfortable and confident in their ability to learn is the ideal environment that most faculty hope for. Respondents suggested that an emotional environment that was open to questions from students helped them build their confidence levels when introduced to new technology. Most mentioned that students loved using technology, but they wanted support in learning to use it. Keeping a positive and optimistic attitude with respect to technology helped students have a sense of security while using it.

Physical Environment. The researcher described the physical environment as the physical classroom layout (design & comfort) and enough learning tools (computers and software) for each class member during the interviews. About half of the respondents interviewed felt that their physical environment was not conducive to using the My ACCESS tool on a regular basis; either the physical layout was not comfortable or there were not computers accessible for their classes to use them on a regular basis. The other half of the respondents interviewed felt they had an abundance of technology tools available to them, and the physical environment was conducive to using the tool on a regular basis.

Acclimation. The researcher described acclimation as the process of becoming adjusted to a new classroom environment or situation as it relates to technology use during the interviews. Several respondents felt that faculty should have enough interaction with students to shape the acclimation. Pre-planned classroom activities that are integrated by subject with the new technology were mentioned by about half of the respondents. Making acclimation a team effort by having students that are more technologically savvy help others students who are not makes it easier for students who are not comfortable to acclimate to the new tool. This peer tutoring also helps faculty.

Feedback Loop in Communications Composite SID

Looking back at the communications composite system, there is one feedback loop:

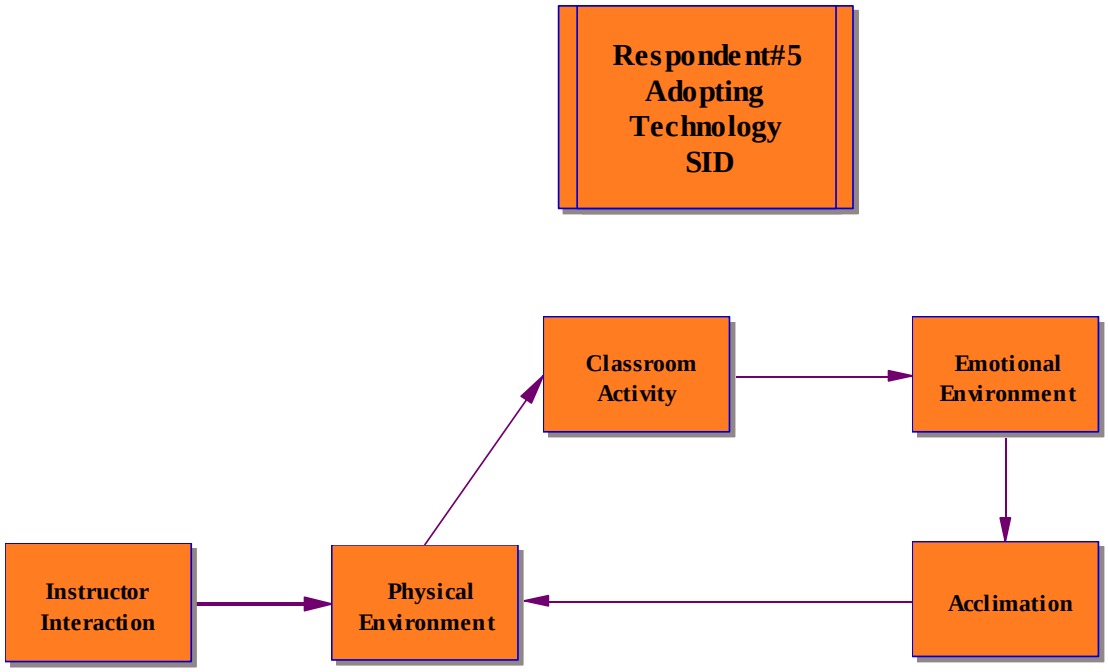


Classroom activity impacts emotional environment and emotional environment influences physical environment which leads back to classroom activity. The classroom activity has a great impact on what the student does and learns, however the instructor has to create the emotional environment that allows the students to do the activity. Emotionally, the faculty and student must be comfortable with computers in order to physically discipline themselves to use them. The physical environment must be capable

of allowing the classroom activities to occur, such as access to computer equipment and other technology resources.

Individual System

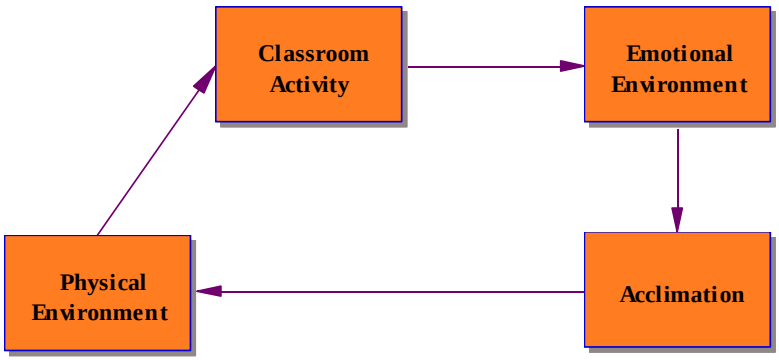
Overall placement of the affinities in the system



Interview 5 is used as an example of an individual system in the adopting technology study. In the above individual's perception, the instructor interaction and the physical environment are driving forces in adopting new technology in the classroom. According to the respondent, "there is a mutual relationship between the physical environment and the instructor interaction, but the interaction that I want to create will help to share that space. The instructor interaction is stronger." The physical

environment then impacts the classroom activity. As stated from one interview, “Yeah, not having the physical environment is a disadvantage in many cases. I think the physical environment will affect the classroom activity.” The classroom activity affects the emotional environment in the individual model. “Depending on what activity you’re doing that day; if somebody feels threatened by a particular activity, then that could affect your emotional environment. The emotional environment impacts the acclimation to something new. “Unless students are in an environment that is emotionally stable and have some confidence in what they are doing, it could affect acclimation.” Acclimation goes back to the physical environment. Having regular access to the physical environment to have “hands on experience” with new technology can impact the acclimation.

Feedback Loop in Individual System



Looking back at the individual system, there is one feedback loop: The physical environment affects the classroom activity which affect emotional environment. The emotional environment influences the acclimation. The acclimation leads back to the physical environment which influences the classroom activity. In a feedback loop, the positive or negative affect could begin from any site. A negative effect at any of the four

affinities could lead to a negative effect for the next affinity influenced by it and thus lead to a negative feedback loop. Therefore, it's important to look at all sites in a feedback loop that can be cut into to help. Positive faculty experiences could influence the feedback loop if there were negative occurrences within the system.

Individual Interview Mindmaps

An Individual Interview Mindmap was developed for each interview after conducting the twenty-one individual interviews with the communications faculty at FCCJ. A SID for each interview is called a mindmap, which reflects the individual faculty's experience with adopting new technology. For each of the twenty-one interviews in the study, a transcript, an axial code table, a theoretical code table (ART), an IRD, and a SID was developed. Together these documents produced systems within the communications group that reflected each individual's thoughts, and provided more detail about each respondent's own experiences. The individual interview mindmaps produced for this study can be found in Appendix G.

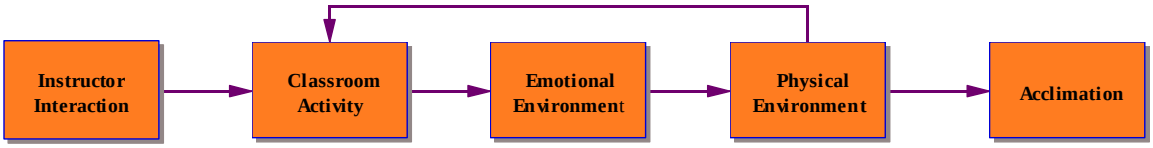
Comparison of the Composite and Individual System

Affinity Name
1. Emotional Environment
2. Physical Environment
3. Acclimation
4. Classroom Activity
5. Instructor Interaction

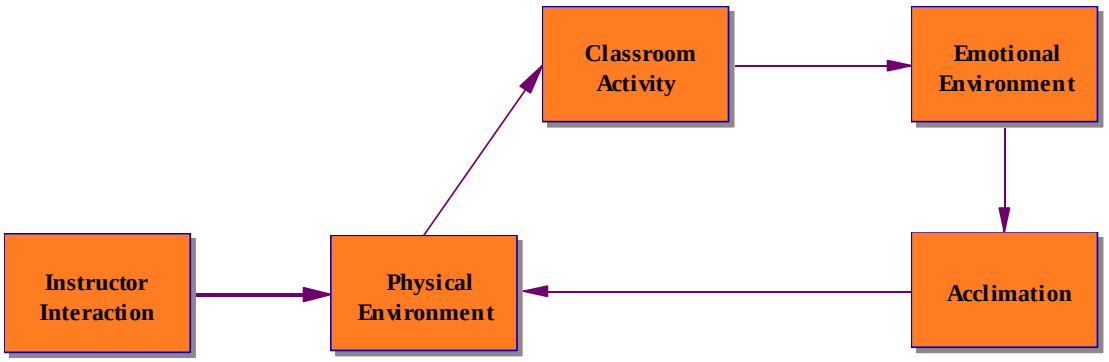
Communications Faculty SID Assignments	
5	Primary Driver
4	Secondary Driver
1	Circulator / Pivot /
2	Secondary Outcome
3	Primary Outcome

Interview 5 SID Assignments	
5	Primary Driver
2	Secondary Driver
4	Circulator / Pivot /
1	Secondary Outcome
3	Primary Outcome

Communications Composite System View



Individual System View



The overall placement of the affinities in the individual and composite system is somewhat similar in that instructor interaction influences all the other affinities and the primary outcome for both systems is acclimation. In the communications system the secondary driver influence is the classroom activity, but in the individual system the secondary driver influence is the physical environment. Classroom activity impacts emotional environment in the communications system whereas physical environment impacts classroom activity in the individual system. The secondary and primary outcomes in the communications system are physical environment and acclimation; but

the secondary and primary outcomes in the individual system are emotional environment and acclimation. Both systems show that the classroom activity impacts the emotional which leads to acclimation.

Comparison of the Campuses and the Communication System

Campus composite systems were developed from the respondents interviewed. For each campus, an axial code table, a theoretical code table (ART), an IRD, and a SID was developed. Together these documents produced systems by campus within the communications group that reflected each campus' thoughts, and provided more detail by campus. The campus composite SIDs produced for the study can be found in Appendix F. Table 1 listed below gives a primary driver to primary outcome matrix for all composite systems in this study.

Table 1. Affinity Driver / Outcome Relationship Matrix for Composite Systems

Drivers and Outcomes	***Communication Composite***	***Campus A Composite***	***Campus B Composite***	***Campus C Composite***	***Campus D Composite***
Primary Drivers	Instructor Interaction	Instructor Interaction	Instructor Interaction	Physical Environment	Instructor Interaction
Secondary Drivers	Classroom Activity	Physical Environment	Classroom Activity	Emotional Environment	Classroom Activity
Circular/ Pivot	Emotional Environment	Classroom Activity	Emotional Environment	Acclimation	Emotional Environment
Secondary Outcomes	Physical Environment	Emotional Environment	Physical Environment	Classroom Activity	Physical Environment
Primary Outcomes	Acclimation	Acclimation	Acclimation	Instructor Interaction	Acclimation

Campus B, D and the communications composite SID had identical drivers and outcomes in their systems. According to the faculty interviews, and the researcher's observations, Campus D had the most technology resources available to faculty. Campus A was also similar to the communications composite SID in that the primary driver was instructor interaction for both, and the primary outcome was acclimation for both. The secondary drivers and secondary outcomes for Campus A and the communications composite showed different influences. Campus A, B C, and communications composite SID contained feedback loops. Campus C's primary drivers and primary outcomes were somewhat different from that of the communications composite of all faculty interviewed. A visual view of each of the campus composite SIDs can be found in Appendix F.

Theoretical Implications

Although this study of adoption of new technologies is a model developed from the research on adoption and influences at Florida Community College in Jacksonville with communications faculty, it may be utilized to enrich the research on adoption of technologies on a much broader scale (other educational systems and institutions of higher learning across the country). As a result, several adoption models have been developed to illustrate the factors that influence adoption of new innovations. Rogers (1995) diffusion of innovation theory centered on the conditions which increase or decrease the likelihood that a new idea, practice, or product would be adopted by members of a given culture. Rogers defined diffusion as "the process by which an

innovation is communicated through certain channels over a period of time among the members of a social system" (Rogers, 1995). This theory and this research study suggests, that over time, the social system, the opinions, needs, and perceptions of the potential adopters are primary forces that influence adoption. A diagram of Rogers' diffusion of innovation theory is listed in Figure 20.

Rogers Diffusion of Innovation Theory

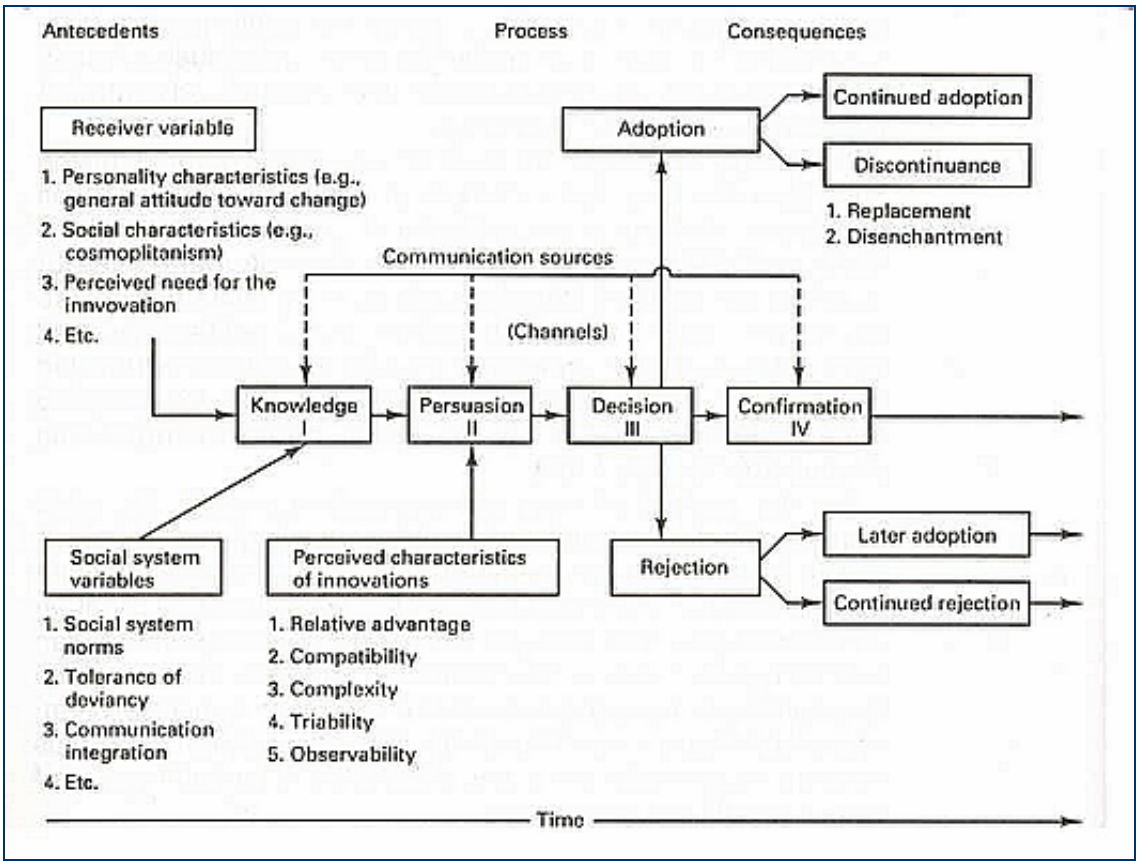


Figure 20: Rogers Diffusion of Innovation Model, Source: Rogers (1995).

Predictions and Interventions

In reviewing Rogers' diffusion model and the communications composite system developed from this research, the affinities and relationships along with other influences

on adoption of technology which are taken from the researcher's review of the interview transcripts, notes and documents from campus visits, classroom observations, individual mindmaps, and campus composite systems developed the Moore adoption theory for FCCJ faculty for My ACCESS is listed below in Figure 21.

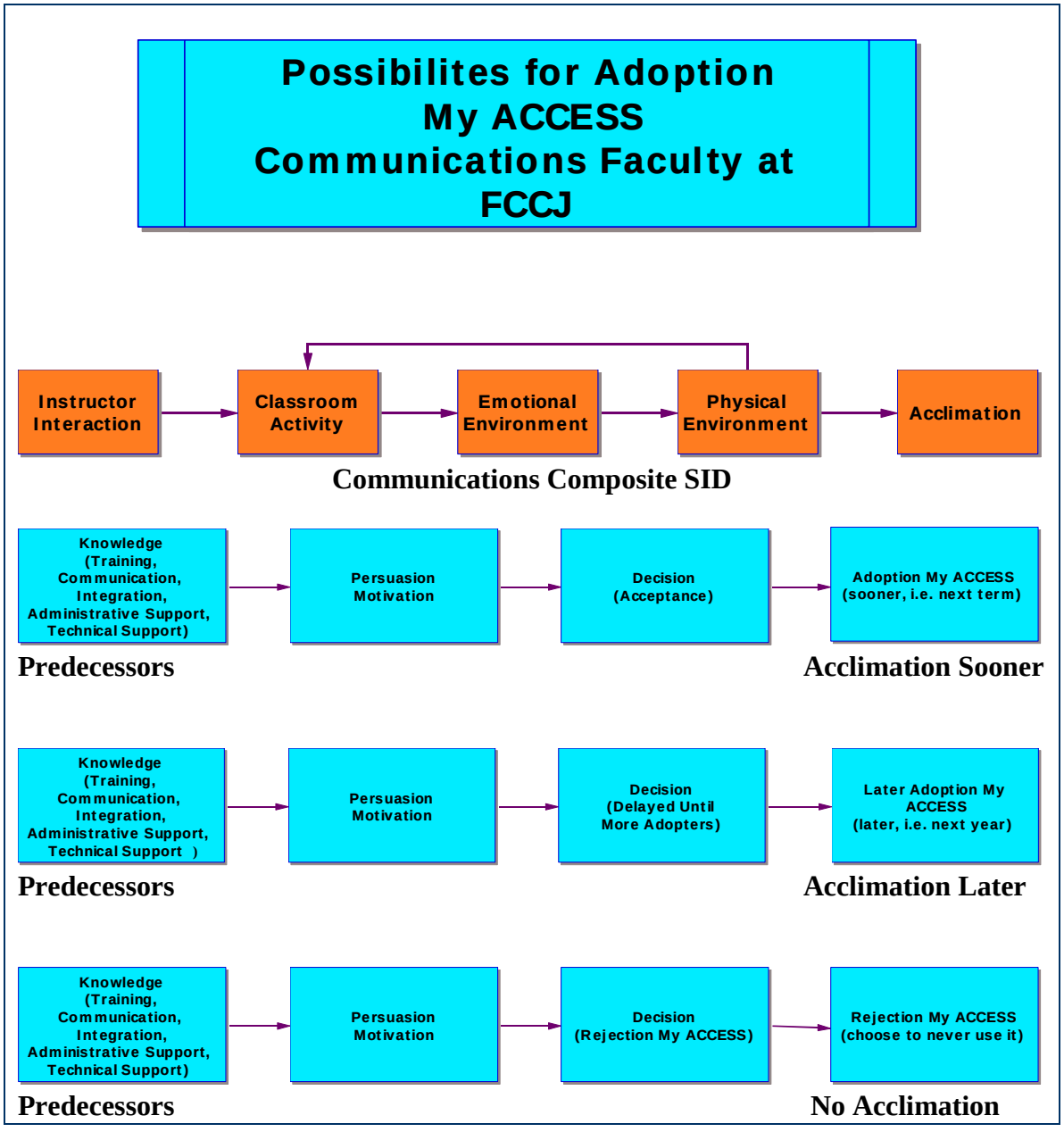


Figure 21: Moore Adoption Theory of My ACCESS for FCCJ Communications Faculty Over Time (Moore, 2005).

Consider the affinities defined in the communications faculty composite system, as a social support system for adoption of new technology, which includes: (knowledge of the software; training; communication of the results of using the software within the discipline, college and on each campus; faculty integration of My ACCESS into classroom activities; a safe and supportive environment created by faculty; administrative support for the infrastructure on each campus; technical support from the vendor, faculty support from the Learning Resource Center, and the college's technical support teams). This could lead to persuasion and motivation within the communications faculty to accept the use of My ACCESS to enhance students' learning sooner, later, or if no interest in technology integration, not at all.

An Update to Innovation Theory

As early as 1903 the French sociologist Gabriel Tarde plotted the original S-shaped diffusion curve used in innovation theory. According to Tarde, the variance was in the slope of the "S" curve. In the 1940's, two sociologists, Bruce Ryan and Neal Gross (1943) published their seminal study of the diffusion of hybrid seed among Iowa farmers. The hybrid-corn study resulted in a renewed wave of research and interest in the diffusion of innovation's S-curve. The rate of adoption in Ryan and Gross was similar to the S-shaped diffusion curve graphed by Tarde forty years earlier. Rogers (1995) theory of innovation also stated the importance of the S-shaped curve because "most innovations have an S-shaped rate of adoption". In his book, *Diffusion of Innovations*, first published in 1962 and now in its fourth edition, Rogers defines the diffusion process as one which is the spread of a new idea from its source of invention or creation to its

ultimate use or adoption. A similarity found in the research studies from Tarde (1903), Ryan and Gross (1943), and Rogers (1995) is that the adoption process or rate of diffusion can be charted on an S-shaped curve. In this study, the research findings as perceived by the communications faculty at FCCJ for the rate of diffusion of technology and the shape of the curve were much more random.

When considering the faculty perceptions and rate of adoption of new technologies in instructional design from this study, a much more random curve occurred that can be adjusted based on a number of *predecessors.* Consider the affinities defined in the communications composite SID – instructor interaction, classroom activity, emotional environment, physical environment, and acclimation as a social system for adoption that can be influenced by predecessors (Figure 21). Establishing policies related to the enhancement of learning with technology by community college governing boards for faculty and enforcement of those policies by the institutional heads creates a natural motivation for faculty to work towards integration of technology over time. An update to Rogers (1995) theory of innovation and a major finding in this study was that the rate of adoption is random and *not* a smooth S-shaped curve. However, the curve can be adjusted forward by creating a social system of support for adoption of new technology as depicted in Figure 21 (knowledge of the software, training, communications of the results within the discipline, college, and on each campus) that can be aligned with internal and external motivators. Aligning policy with a social system of support for technology and internal motivators (feelings and attitude) and external motivators (access and support) for faculty can shift the innovation curve and affect the rate of adoption.

Suggestions for Applications or Practice

Technology can no longer be described as merely an optional enhancement to the traditional forms of teaching and learning, but in the high-tech world of the twenty-first century, technology has become a critical component of the academic infrastructure. This study adds to the body of literature in the field of integrating technology into developmental education, writing assessment, learning communities, and instructional design, particularly in the area of technology-based learning over the Web. Since the literature documenting a systematic approach to integrating technology with research-based teaching and learning strategies is relatively sparse, the study makes an important contribution to broadening that base. If faculty want to use technology and have access to it, many will develop classroom activities that integrate technology and the subject matter in classroom activities that enhance students learning. Ultimately, faculty are in the driving seats with respect to adoption of new technology into the academic infrastructure and they should be given as much support in the process as possible.

Suggestions for Further Research

Although the findings of this research involve a single case study involving communications faculty at FCCJ there may be commonalities with other institutions of higher learning that aspire to increase the integration of technology within the instructional design processes on their campuses. Reviewing the perceptions of faculty in adopting new technologies like My ACCESS and what motivates faculty to adopt a particular technology or not, can help other campuses better understand the process of

technology integration on their campuses. The following are recommendations for further research:

1. A study that investigates the adoption of additional Web-based technologies that could be used to enhance other areas of developmental education, such as mathematics and reading; Using additional web-based tools that can be accessed in class or independently in labs or learning centers gives students more opportunities for practice and greater access to technology.

2. A case study that compares the perceptions and findings of FCCJ communications faculty to the perceptions and findings of another community college that adopts the use of My ACCESS into their communications courses to enhance learning.

3. A case study that compares the levels of student participation and collaboration in traditional face-to-face course(s) with lecture in a particular subject to those that are taught in hybrid course(s) with more technology integration in the classroom activities.

4. A case study at FCCJ that compares developmental courses that use My ACCESS to improve teaching and learning and those that do not. What role has technology (My ACCESS) played in helping students become more independent, self regulating, self-confident learners? What percentage of students in the technology-rich courses has a higher percentage of writing competency compared to those courses that do not use My ACCESS?

Conclusion

This study was designed to develop a systematic description of adoption of new technologies from the faculty's point of view to better understand the integration of technology into instructional design. Using the IQA methodology, five affinities were identified as related to the adoption of technology: instructor interaction, classroom activity, emotional environment, physical environment, and acclimation.

A closer look at each of the affinities and their relationships within the system led to a new model of adopting new technology and an updated approach to innovation theory. This model may be use in the adoption and integration of technology into instructional design in other colleges. This study helps to better understand faculty experiences with adopting new technology and enriches the current theories of adoption and innovation. The model developed from this study will benefit future colleges and their understanding of the faculty experience in adoption of new technologies into instruction over time.

"In the education sector, it is becoming increasingly apparent to scientifically oriented educators that education must discard the folklore approach to instruction and move forward to new frontiers, this includes the development of instructional systems based on behavioral science theory, research, and development." (Saettler, 1968, p. 270).

APPENDICIES

Appendix A

Focus Group Session

Focus Group Activities

On September 28, 2004, the researcher held a focus group and invited forty-one FCCJ communications faculty from four campuses and one center to attend. Seven communications faculty were able to participate in the focus group session. A description of the focus group activities and the faculty responses from the focus group is listed below:

Florida Community College at Jacksonville has been named the most #1 community in that they are the most wired and encourage innovation. The faculty continues to play a huge part in the college's growth in technology and innovation.

In this focus group which will be followed by individual faculty interviews, we hope to understand more about faculty adoption of technology into instructional design and relevance to improving the teaching and learning process.

I really need your help in making this session the best that it can be. I'm going to ask you to tell me about your experience with adopting new technology in your classes at FCCJ.

- ✓ To begin, try to get as comfortable as you can.
- ✓ Close your eyes
- ✓ Please put aside your thoughts of the day, and take a deep breath.
- ✓ Now imagine yourself in your classroom from the first day through last week. (long pause).
- ✓ On the first day, you're pleasantly surprised in that you and your class all have new computers and a new color printer filled with new software that you reviewed in a workshop.
- ✓ See yourself engaging in the activities of the class. (long pause).
- ✓ You think about the new computers and software and how you might integrate them into your usual pedagogy for this class section.
- ✓ Notice your surroundings. (long pause). Looking around your, take in the sights and sounds that are associated with being in class. (long pause).
- ✓ Allow yourself to become aware of your environment with all of your senses.
- ✓ Focus on what if feels like to be totally absorbed in the class. Be there in your mind. (long pause).

Now, Tell me about your experience with your courses and whether or not you make use of new technology that has been made available to you and your students.

Please think of words, phrases, mental pictures, or memories of experiences in your courses from your first meetings until the present class.

Please take four cards and a marker and write your experiences on a card. Please write one experience per card.

There are no right or wrong answers; Using words, phrases, or sentences on your card to describe what you have experienced. Please write your cards in silence. It does not matter what others are writing, your own experiences are needed.

Please turn over all cards and pass them to the end of the row. All cards will be lumped so the authors will be unknown.

Let's break up into groups and tape each of the cards to the wall. Once all the cards are taped, please break up into groups and began to move the cards into columns.

The cards in the columns should have a similar theme. If anyone disagrees with where a card has been moved, then they are free to move it to another column. Please do not talk about where the cards should go, just place them in columns.

If a card is unclear, please ask the author or another member to clarify it for the group.

After the cards are placed and meanings are clarified, the group can write out any new cards that might have come to mind after reading what the others wrote.

The facilitator began with the column that seemed to be the easiest to name and asked the group to give it a name. A new card reflecting the name is placed above the column. The facilitator continues with each column until all the columns are names

Please examine the names to see if dialectic of a higher theme is needed; For example love and hate might be opposites, but fall under a higher theme of emotions. When several columns were combined under one newly named category, the original columns became sub-affinities.

Faculty Responses from Focus Group Session

When asked tell me about your experiences with 'Adopting New Technology in the classroom' each faculty member generated a number of cards. The cards were then sorted by themes, called affinities in IQA. A summary of the focus group affinities and descriptions from the cards generated during the focus session is listed below:

1. **Environment (Emotional & Physical)**
   - ❖ Purple cushion chairs and lavender carpet, desire to decorate own classroom

- Computers not on desktop is preferred. In separate area away from class and groups
- Each student having access to a computer (enough for each class member)
- A divider in the room
- Questions
- Students conversing with one another
- Curious in Nature
- Quality Assurance for the student
- Functionality
- Applicability

2. Acclimation

- Students weariness of new technologies
- Technology literacy of the students
- Students taking advantage of the learning center

3. Classroom Activity

- Tenacious students
- Engaged students
- Interest fascination of students with technology
- Active students
- Resourcefulness of students

4. Instructor Interaction

- The ability to use the server to communicate with each student (in or out of class)
- Time factor of learning a new technology
- Teacher confidence in the new technology - reliability

Appendix B

Faculty Interview Protocol

Adopting New Technology
Interview Protocol

The communications faculty focus group session held on September 28, 2004 identified several common themes or affinities that describe their experiences in adopting new technologies in instructional design. Let's look at each of these themes one at a time. Please tell me about your experiences with each affinity.

Axial Coding

1. Emotional Environment

Emotional environment can be described as a positive healthy learning environment where students feel comfortable and confident in their ability to learn. Tell me about emotional environment in your classes.

2. Physical Environment

Physical environment can be described as the physical classroom layout (design, comfort) and enough learning tools (computers and software) for each class member**.** Tell me about the physical environment on your campus.

3. Acclimation

Acclimation can be described as the process of becoming adjusted to a new classroom environment or situation. Tell me about acclimation as it relates to adopting new technology in the classroom.

4. Classroom Activity

Classroom activity can be described as the individual student and group interactions in the classroom that are planned by the instructor**.** Tell me about classroom activity as it relates to adopting new technology.

5. Instructor Interaction

Instructor interaction can be described as the enthusiasm, caring, support, and energy that the instructor brings to the classroom. Tell me about instructor Interaction in your classes.

Theoretical Coding

Many of the themes or affinities identified have some kind of relationship; one effects or causes the other. Let's look at each theme and decide if or how it relates to each other theme. Tell me about your experiences with such relationships. Please give specific examples of how the relationships have affected your experiences with technology in the classroom.

Affinity Name
1. Emotional Environment
2. Physical Environment
3. Acclimation
4. Classroom Activity
5. Instructor Interaction

Possible Relationships
A → B
A ← B
A <> B (No Relationship)

Interview

Affinity Relationship Table

Affinity Pair Relationship			Affinity Pair Relationship		Affinity Pair Relationship
1	2				
1	3				
1	4				
1	5				
2	3				
2	4				
2	5				
3	4				
3	5				
4	5				

Appendix C

Description of FCCJ Communications Faculty

FCCJ Communications Purposive Sample

There were forty-one communications faculty from four campuses included in the purposive sample.

Campus	Name	Discipline	#Years Teaching FCCJ
A	FCCJ Communications Faculty1	English	1
A	FCCJ Communications Faculty2	Reading	6
A	FCCJ Communications Faculty3	English	3
A	FCCJ Communications Faculty4	English	5
A	FCCJ Communications Faculty5	Reading	8
A	FCCJ Communications Faculty6	English / Reading	22
A	FCCJ Communications Faculty7	English	10
A	FCCJ Communications Faculty8	English/Reading	10
A	FCCJ Communications Faculty9	English/Reading	1
A	FCCJ Communications Faculty10	English	1
A	FCCJ Communications Faculty11	English	1
B	FCCJ Communications Faculty12	English	20
B	FCCJ Communications Faculty13	English	6
B	FCCJ Communications Faculty14	English	7
B	FCCJ Communications Faculty15	Adult Studies	20
B	FCCJ Communications Faculty16	Reading	10
C	FCCJ Communications Faculty17	Adult Studies	12
C	FCCJ Communications Faculty18	English	1
C	FCCJ Communications Faculty19	English	18

C	FCCJ Communications Faculty20	English	2
C	FCCJ Communications Faculty21	English	2
C	FCCJ Communications Faculty22	English	2
C	FCCJ Communications Faculty23	English	8
C	FCCJ Communications Faculty24	Reading	25
D	FCCJ Communications Faculty25	Reading	9
D	FCCJ Communications Faculty26	GED	13
D	FCCJ Communications Faculty27	English	10
D	FCCJ Communications Faculty28	Reading	13
D	FCCJ Communications Faculty29	GED	1
D	FCCJ Communications Faculty30	English	1
D	FCCJ Communications Faculty31	ESL / Developmental	8
D	FCCJ Communications Faculty32	English	3
D	FCCJ Communications Faculty33	Reading	25
D	FCCJ Communications Faculty34	Reading	1
D	FCCJ Communications Faculty35	Reading	15
D	FCCJ Communications Faculty36	Reading	8
D	FCCJ Communications Faculty37	English	6
D	FCCJ Communications Faculty38	English	10
D	FCCJ Communications Faculty39	English	10
D	FCCJ Communications Faculty40	Reading	15
D	FCCJ Communications Faculty41	English	26

All FCCJ communications faculty in the purposive sample were full-time.

Appendix D

Data Collection, Individual Interviews, Faculty Training, and Other Participants

The data collection established over four months (August 2004 – December 2004) included meetings, a focus group, individual faculty ,interviews, on-site training, electronic training, telephone calls, and emails are listed below:

Date	Description	Data Collected / Meeting / Training	Comments
8/26/2004	Researcher gave ten minute overview of adoption technology study with all communications faculty at college-wide convocation		Great opportunity to introduce myself and the study and let faculty know the purpose, and anticipation of the focus group and interviews.
9/29/2004	Focus Group Session with FCCJ communications faculty	Collected affinities and data to create interview protocol.	
10/7/2004	Faculty Interview1	Taped and transcribed	Individual interview (30-40 minutes), taped and transcribed.
10/8/2004	All day training (8:00 – 3:00) held for communications faculty.	Training meeting to learn to use My ACCESS, a new writing software by Vantage Learning	Thirteen faculty attended the Vantage Learning training. Observations and field notes also obtained from trainings.
10/11/2004	Faculty Interview2	Transcript	Individual interview (30-40 minutes), taped and transcribed.
10/11/2004	Faculty Interview3	Transcript	Individual interview (30-40 minutes), taped and transcribed.
10/13/2004	Faculty Interview4	Transcript	Individual interview (30-40 minutes), taped and transcribed.
10/13/2004	Faculty Interview5	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
10/14/2004	Faculty Interview6	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
10/14/2004	Faculty Interview7	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
10/14/2004	Faculty Interview8	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
10/15/2004	Faculty Interview9	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/4/2004	Faculty Interview10	Transcript	Individual interviews (30-40

			minutes), taped and transcribed.
11/4/2004	Faculty Interview11	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/8/2004	Faculty Interview12	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/8/2004	Faculty Interview13	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/10/2004	Faculty Interview14	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/10/2004	Faculty Interview15	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/10/2004	Faculty Interview16	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/10/2004	Faculty Interview17	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/10/2004	Faculty Interview18	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/16/2004	Faculty Interview19	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/16/2004	Faculty Interview20	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
11/17/2004	Faculty Interview21	Transcript	Individual interviews (30-40 minutes), taped and transcribed.
12/2//2004	2.5 hour training held for communications faculty. Trainer was remote and the faculty were located in the FCCJ Urban Resource Center, in downtown Jacksonville.	Additional training opportunity to learn to use My ACCESS, a new writing software by Vantage Learning	Six communications faculty attended the Vantage Learning training.
8/26/04 – 12/17/04	Emails and telephone calls to communications faculty at FCCJ.		On going during the four-month study.

All FCCJ communications faculty interviewed individually were full-time.

Other Participants

Name	Title	Participant #
Dr. Donald Green	Executive Vice President for Instruction and Student Services	1
Dr. Jack Chambers	Director of Program Development-Instructional Technology	2
Mable J. Moore	Administrative Intern, and Researcher for this study.	3
Patti Levine-Brown	FCCJ Communications Faculty, English, Reading, Developmental, Faculty Advocate	4
Rusty Gardner	FCCJ Technical Support for training with My ACCESS software	5
Andy Reeves	Vice President State Initiatives, Vantage Learning	6
Matt Whiter	Vantage Learning Trainer for October 8, 2004 My ACCESS training session.	7
Donna Blessing	Vantage Learning Trainer for December 2, 2004 My ACCESS training session held using distance learning software.	8

Appendix E

Researcher Timeline

Research Timeline/Schedule

Timeline:

Date:	Activity:
August 26, 2004	First day of internship at FCCJ; College-wide Convocation. Communications faculty member, Patti-Levine Brown introduced me to other faculty members that allowed me to introduce myself, and describe the adopting new technology study.
September 28, 2004	Focus group session. All communications faculty in purposive sample invited. Thirteen attended.
October 7 – November 17, 2004	Individual communications faculty interviews held in faculty offices, during their office hours.
October 7 – December 6, 2004	Interviews transcribed and returned to faculty members for triangulation. Faculty allowed to edit and email transcript back to researcher.
October 8, 2004	Training Session on using My ACCESS, an online instructional writing tool. Conducted by professional trainer from Vantage Learning. Hands on training, all-day session, individual manuals given to each faculty member in attendance. Thirteen attended the training.
October 8 – December 12, 2004	Telephone calls, emails conducted by researcher to discuss transcripts and other observations and field notes.
December 2, 2004	Training Session on using My ACCESS. Conducted by Vantage Learning trainer electronically using GOTO Meeting online software and Internet Protocol conference calling. Faculty and researcher were located in the Urban Resource Center in downtown, Jacksonville.
	Continue with conference calls and telephone calls to discuss development of the two 'writing prompts' for the college.
December 17, 2004	Last day of internship at FCCJ
December 28 – Jan 31, 2005	Write and review Chapters 4 & 5 of dissertation Qualitative data from fall 2004

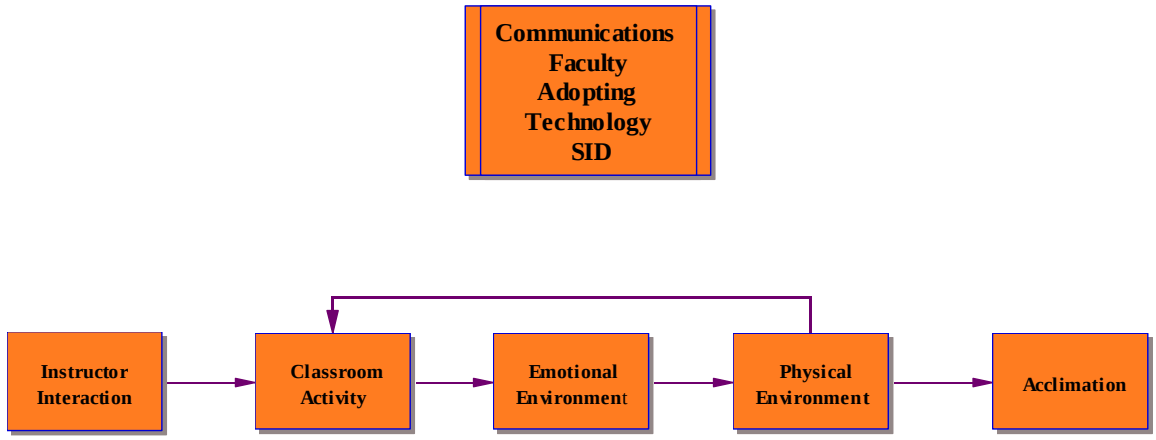
	data collection.
Friday, February 25, 2005	**Present Findings to Dissertation Committee at University of Texas at Austin, CCLP Program:** **Dissertation Committee:** *Dr. John E. Roueche (Director CCLP), Dr. William Moore (CCLP), Dr. Norvell Northcutt (CCLP), Dr. Don Green (EVP, FCCJ), Dr. Margo Perez-Greene (NISOD), and Dr. Randall Parker.*
March 1 – March 15, 2005	Copyright and Publish Dissertation Study. (Mable J. Moore)

Tools uses by Researcher: Inspiration v7.5, Microsoft (Word, PowerPoint, Excel).

Appendix F

Composite SIDS

FCCJ Communications Faculty
Composite SID

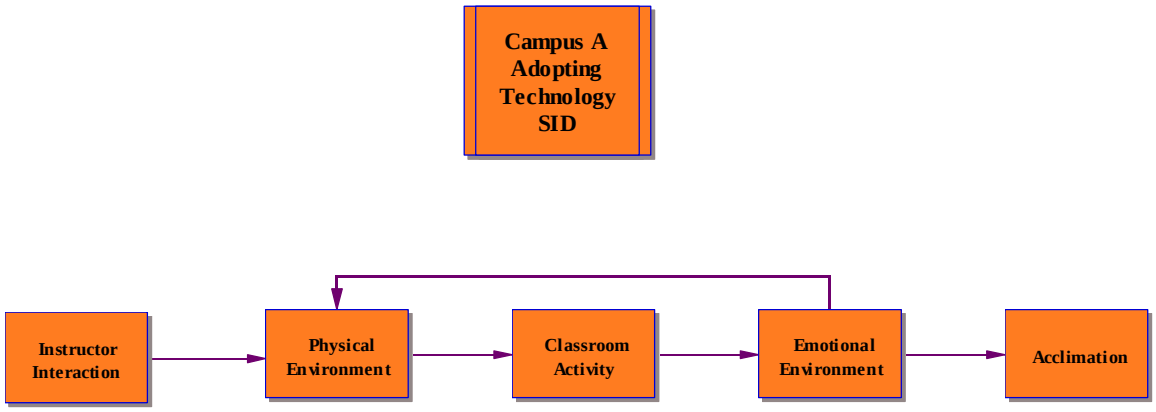


Affinity Name

1. Emotional Environment
2. Physical Environment
3. Acclimation
4. Classroom Activity
5. Instructor Interaction

Communications Faculty SID Assignments	
5	Primary Driver
4	Secondary Driver
1	Circulator / Pivot /
2	Secondary Outcome
3	Primary Outcome

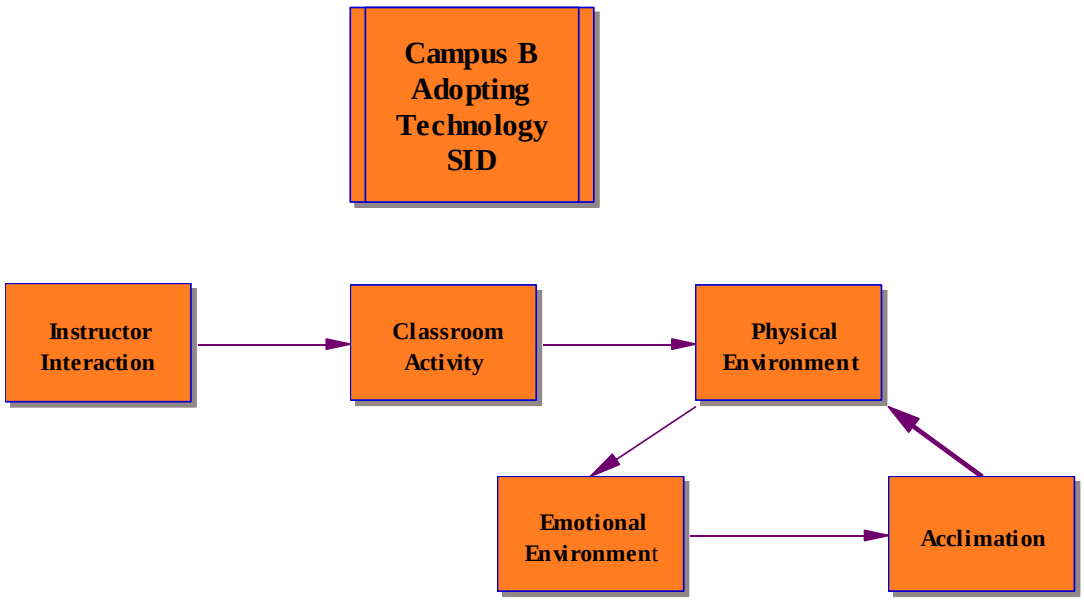
Campus A
Composite SID



Affinity Name
1. Emotional Environment
2. Physical Environment
3. Acclimation
4. Classroom Activity
5. Instructor Interaction

Campus A SID Assignments	
5	Primary Driver
2	Secondary Driver
4	Circulator / Pivot /
1	Secondary Outcome
3	Primary Outcome

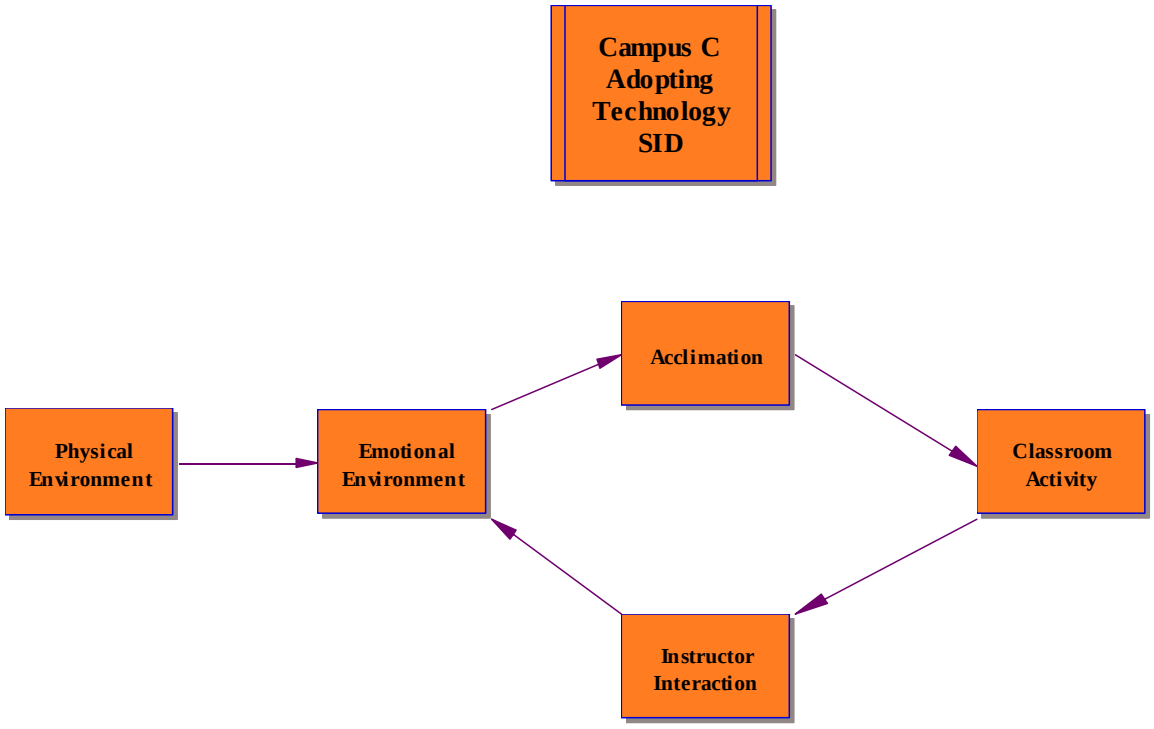
Campus B
Composite SID



Affinity Name
1. Emotional Environment
2. Physical Environment
3. Acclimation
4. Classroom Activity
5. Instructor Interaction

Campus B SID Assignments	
5	Primary Driver
4	Secondary Driver
1	Circulator / Pivot /
2	Secondary Outcome
3	Primary Outcome

Campus C
Composite SID

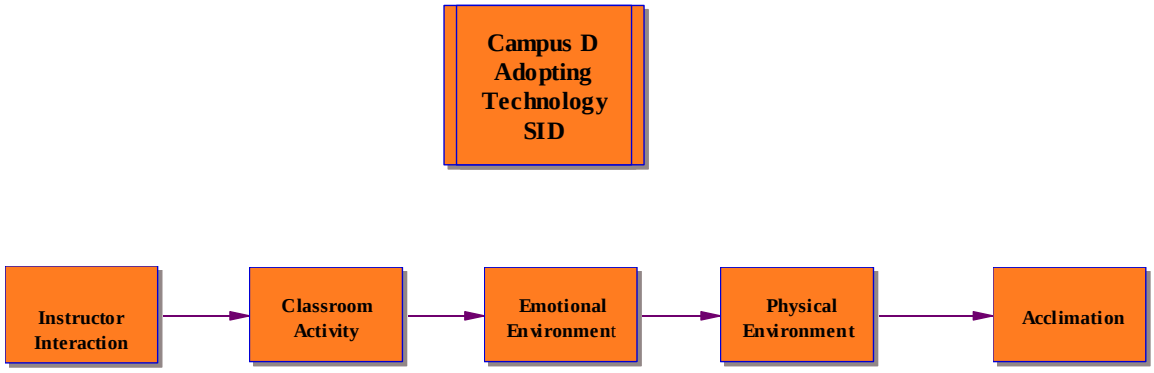


Affinity Name

1. Emotional Environment
2. Physical Environment
3. Acclimation
4. Classroom Activity
5. Instructor Interaction

Campus C Tentative SID Assignments	
2	Primary Driver
1	Secondary Driver
5	Circulator / Pivot /
3	Secondary Outcome
4	Primary Outcome

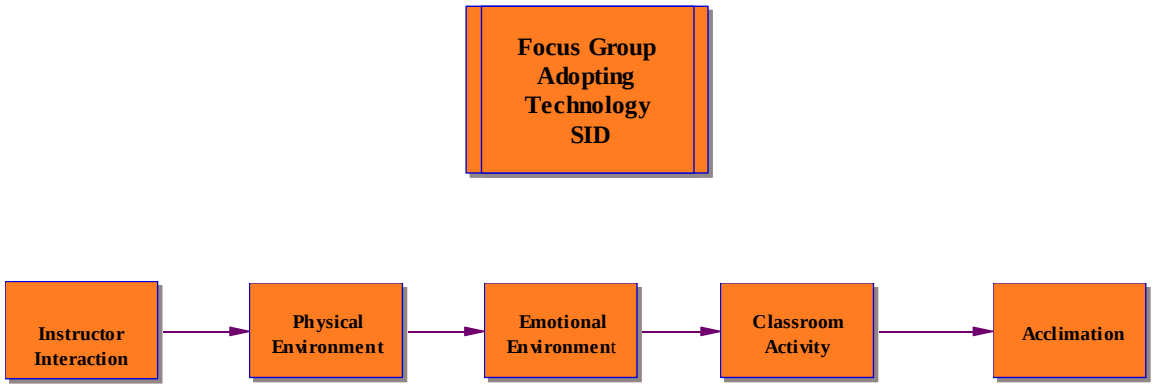
Campus D
Composite SID



Affinity Name
1. Emotional Environment
2. Physical Environment
3. Acclimation
4. Classroom Activity
5. Instructor Interaction

Campus D SID Assignments	
5	Primary Driver
4	Secondary Driver
1	Circulator / Pivot /
2	Secondary Outcome
3	Primary Outcome

Focus Group
Composite SID



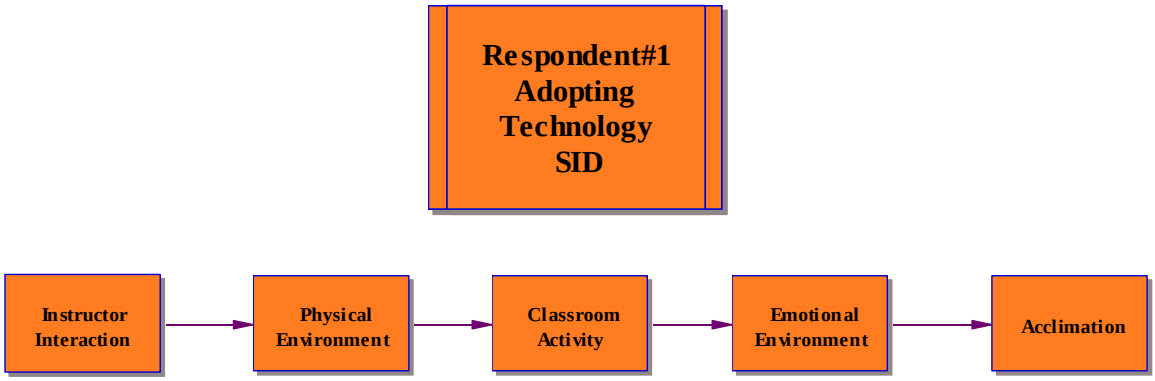
Affinity Name
1. Emotional Environment
2. Physical Environment
3. Acclimation
4. Classroom Activity
5. Instructor Interaction

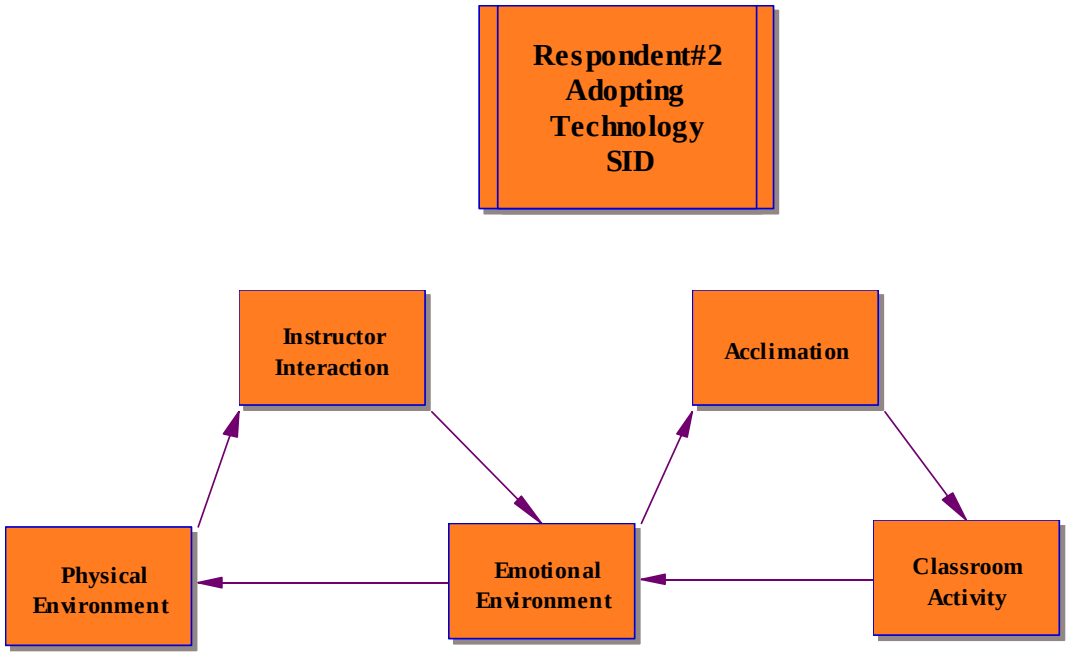
Focus Group SID Assignments	
5	Primary Driver
2	Secondary Driver
1	Circulator / Pivot /
4	Secondary Outcome
3	Primary Outcome

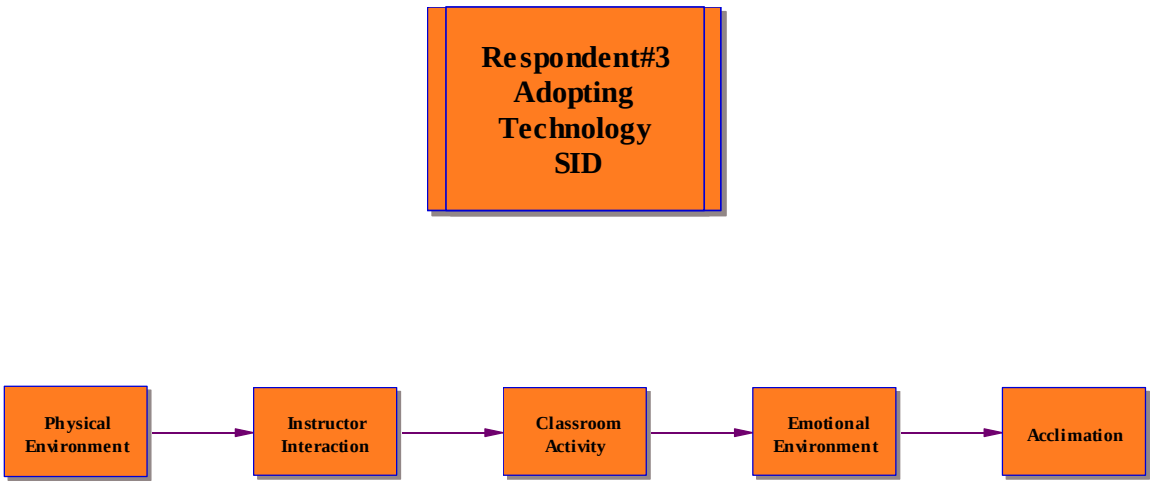
Appendix G

Individual Interview Mindmap SIDS

Individual Interview Mindmap SIDS



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Activity
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Environment
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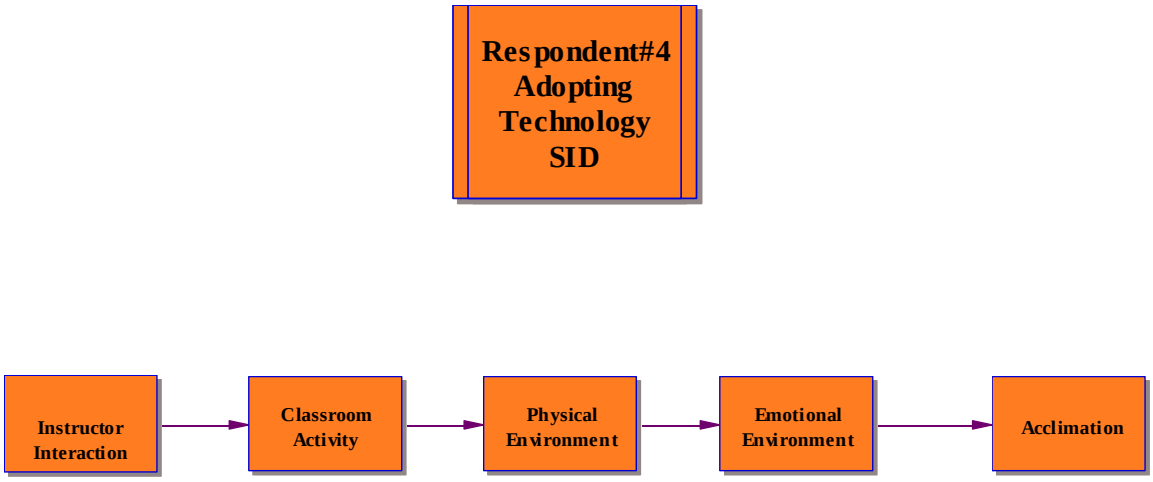
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Emotional
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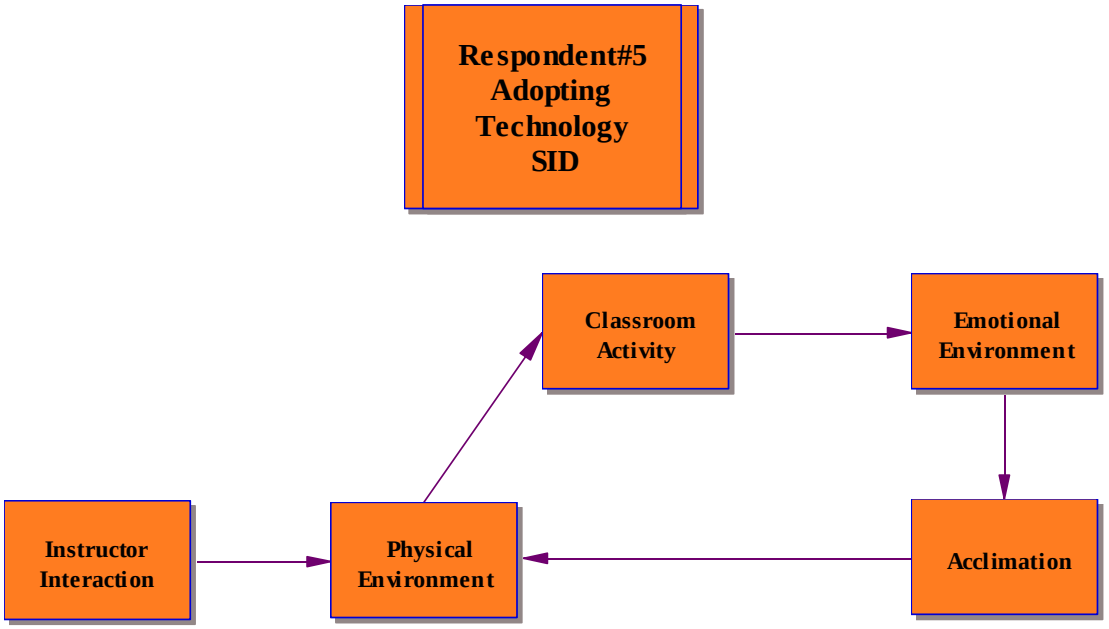
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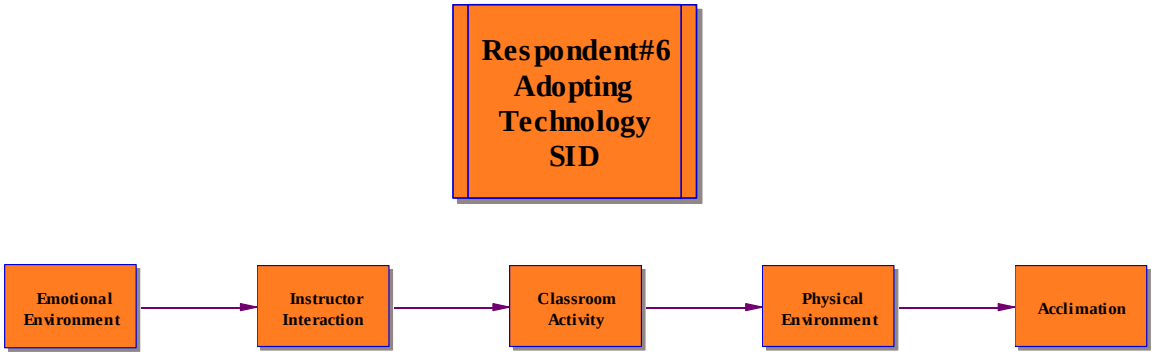
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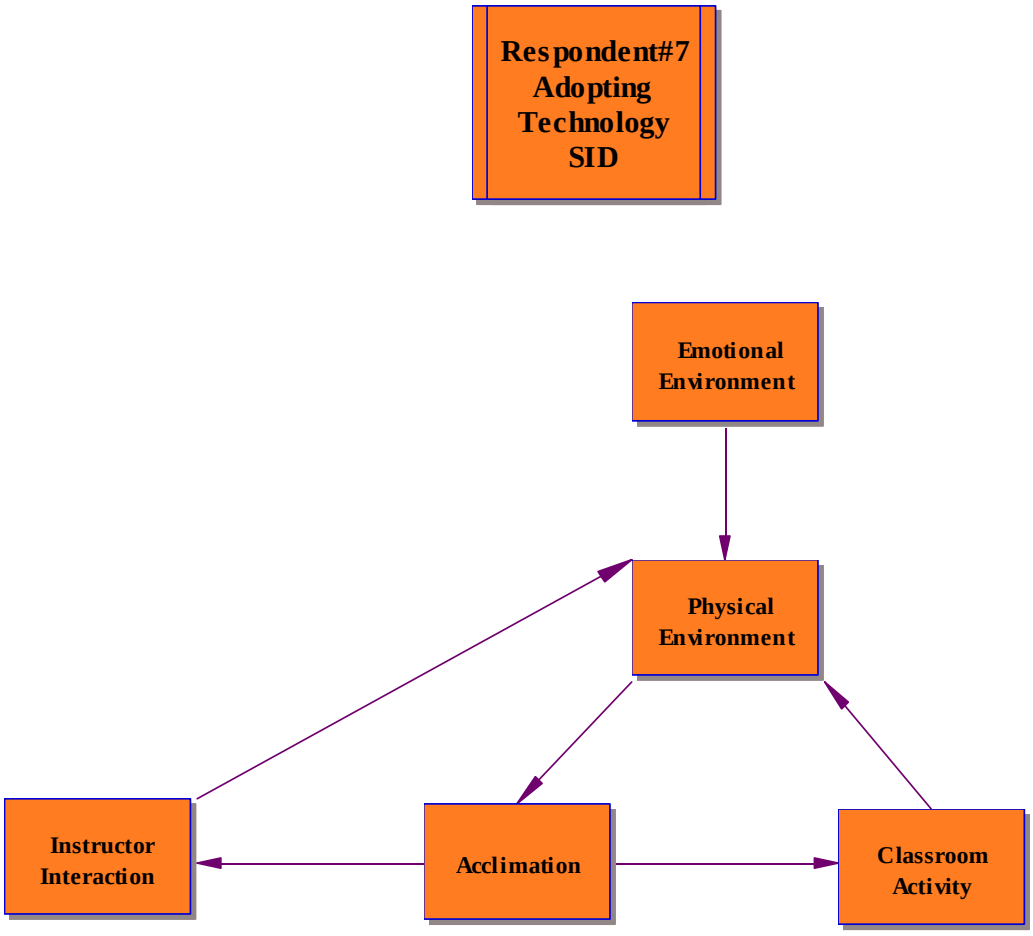
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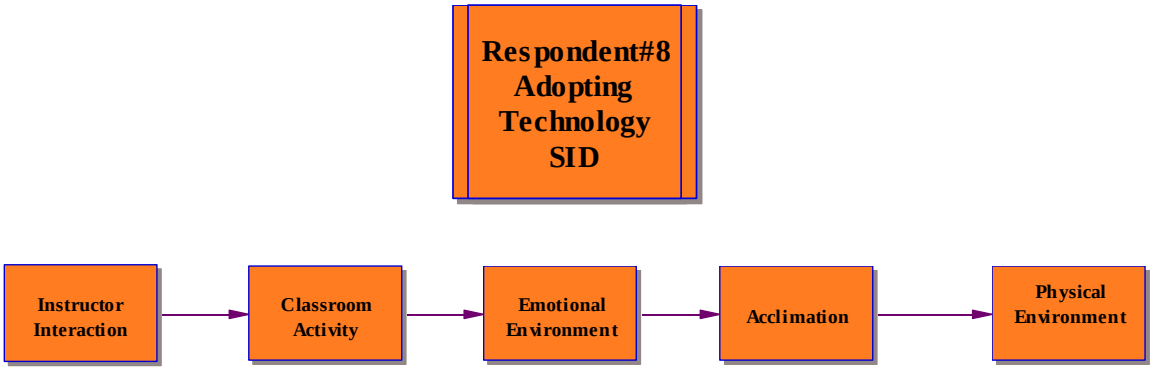
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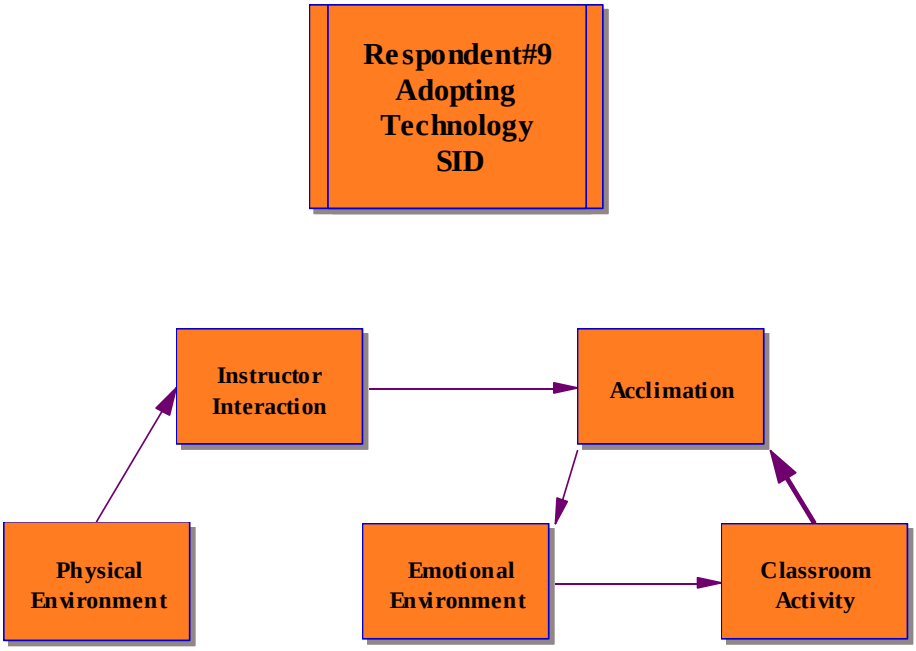
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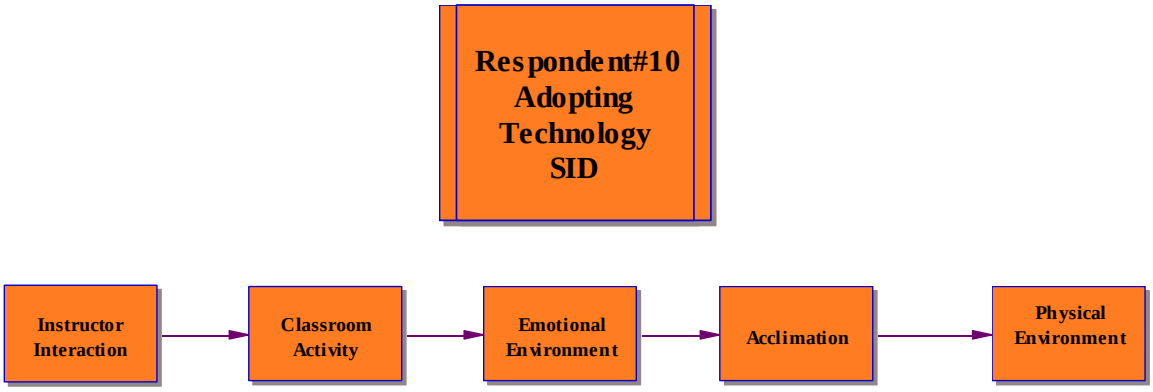
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Environment
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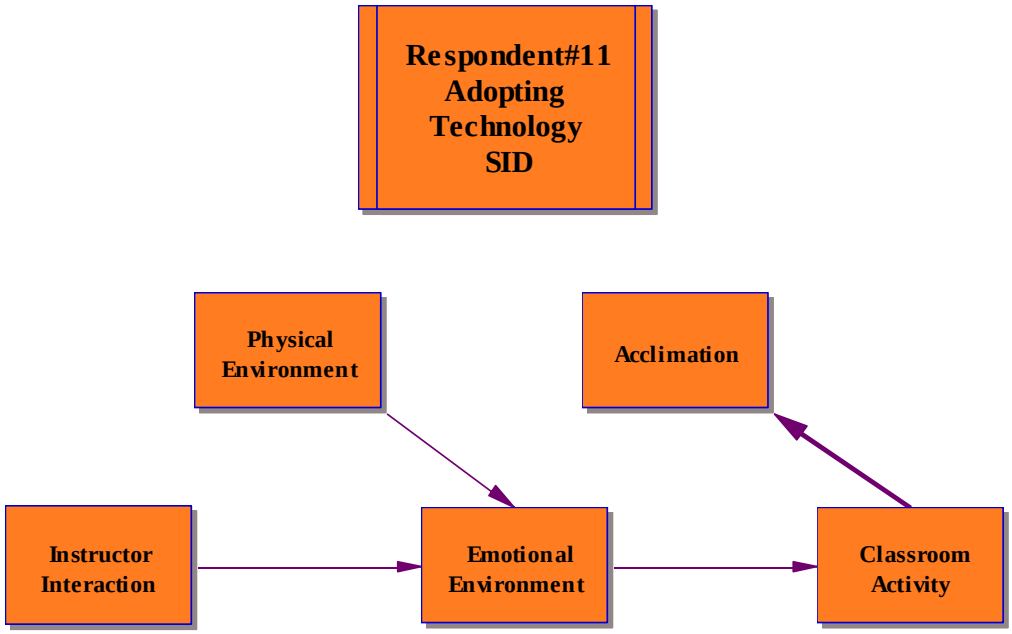
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Classroom
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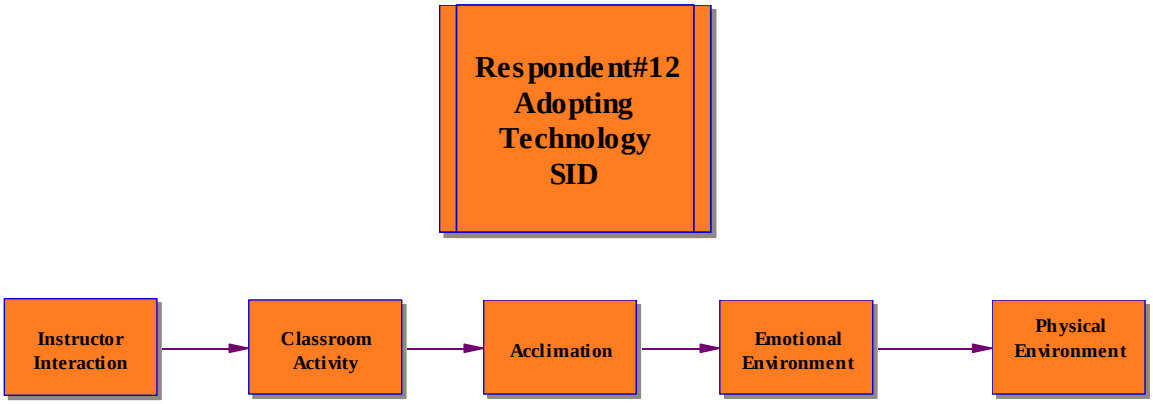
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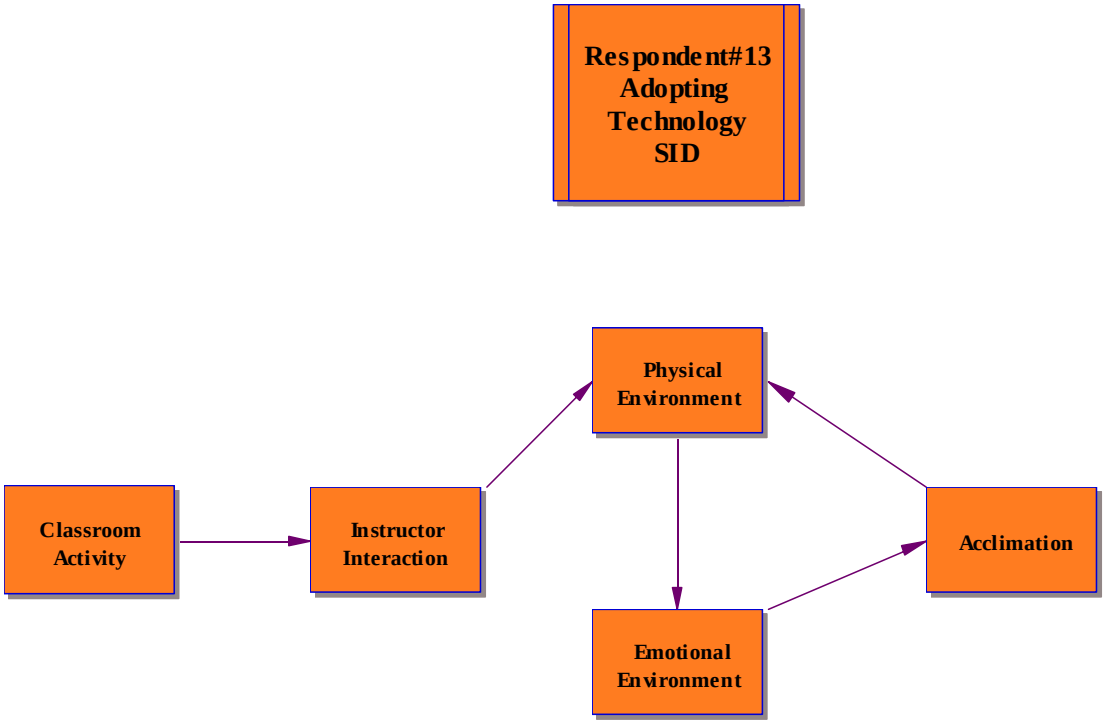
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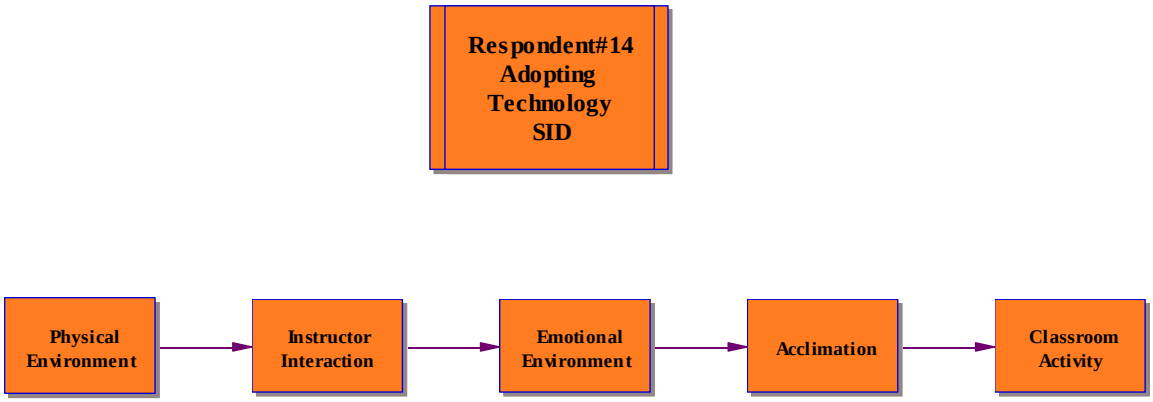
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Environment
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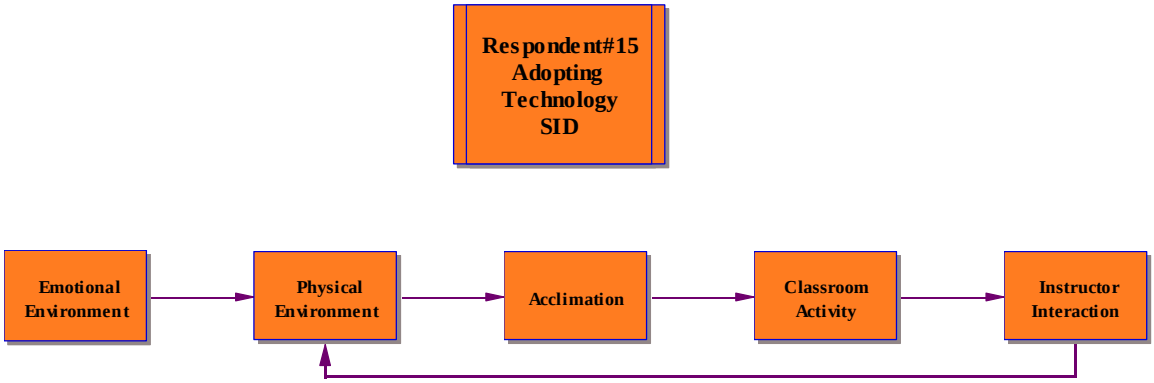
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Activity
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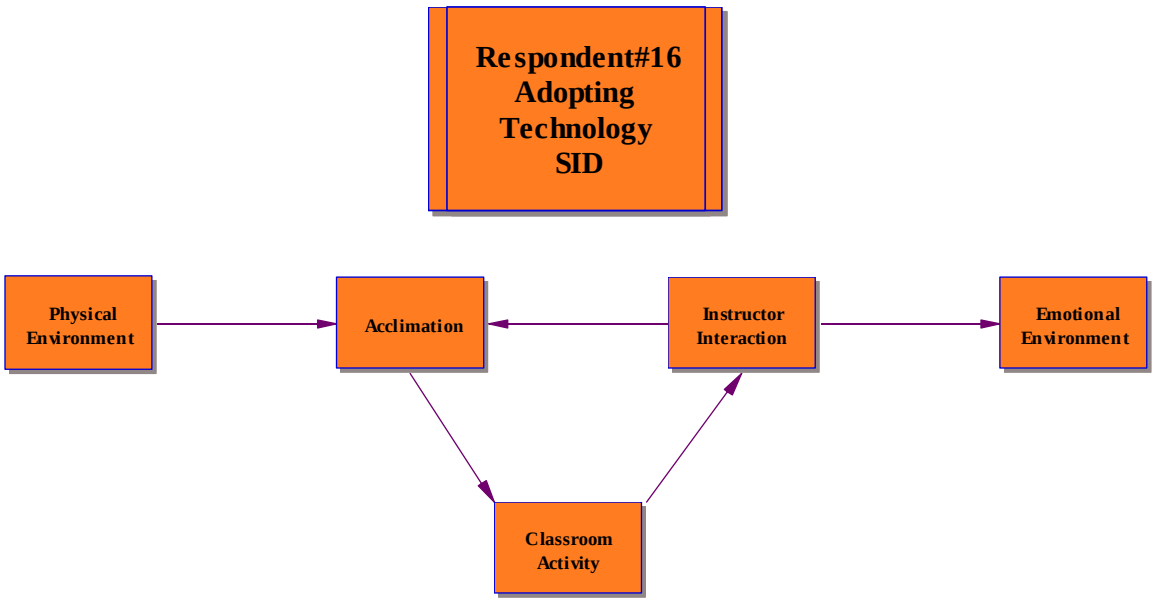
Interaction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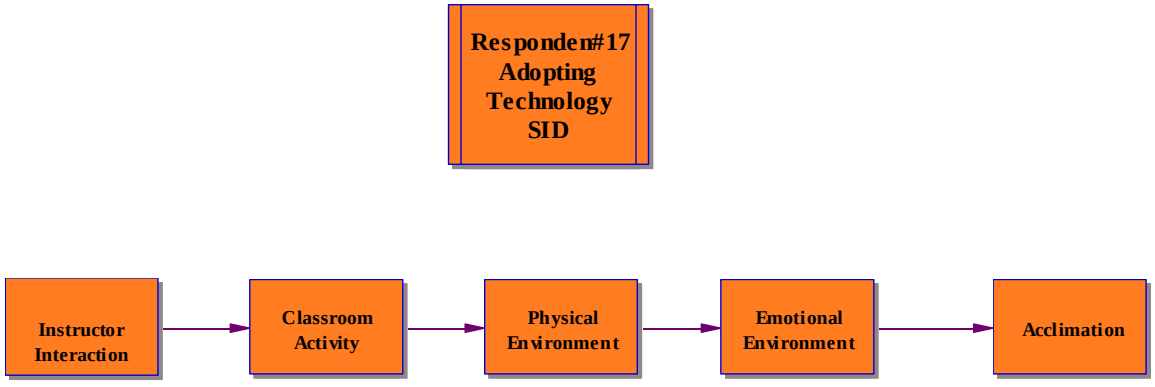
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Activity
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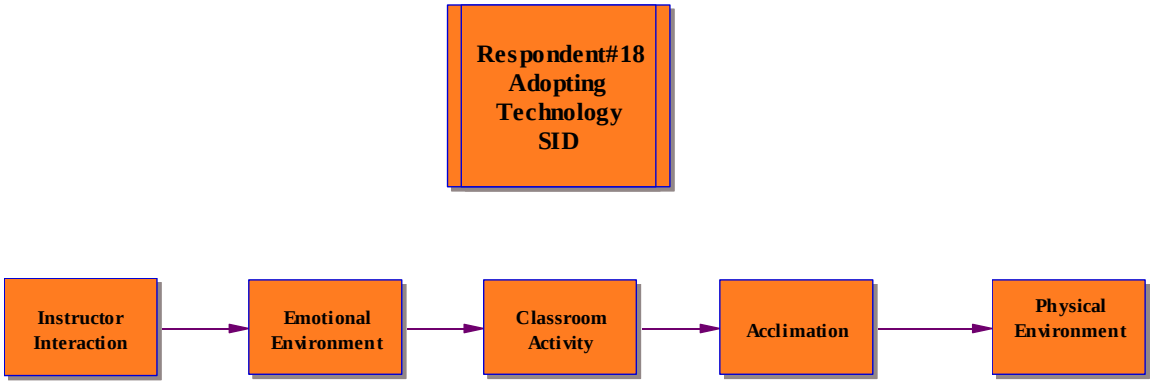
Environment
Emotional
Environment
Acclimation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Acclimation
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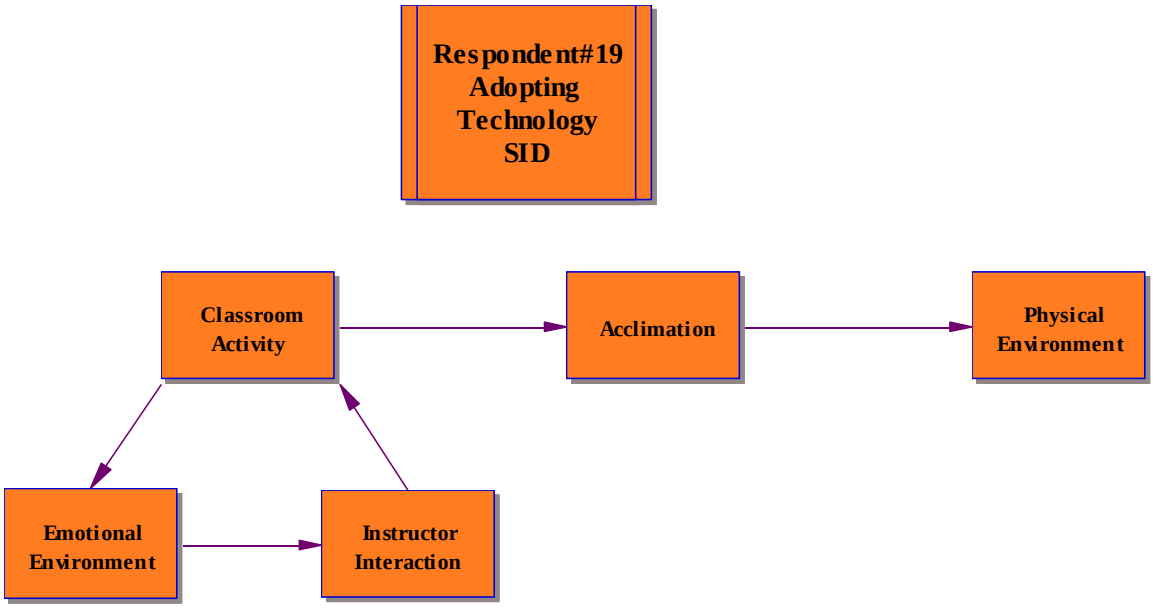
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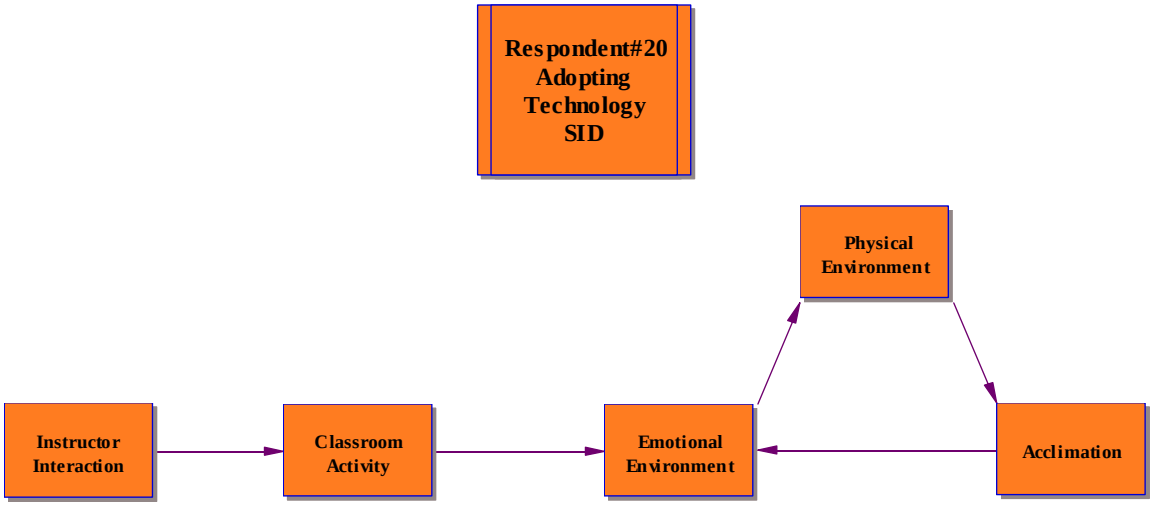
Emotional
Environment
Instructor
Interaction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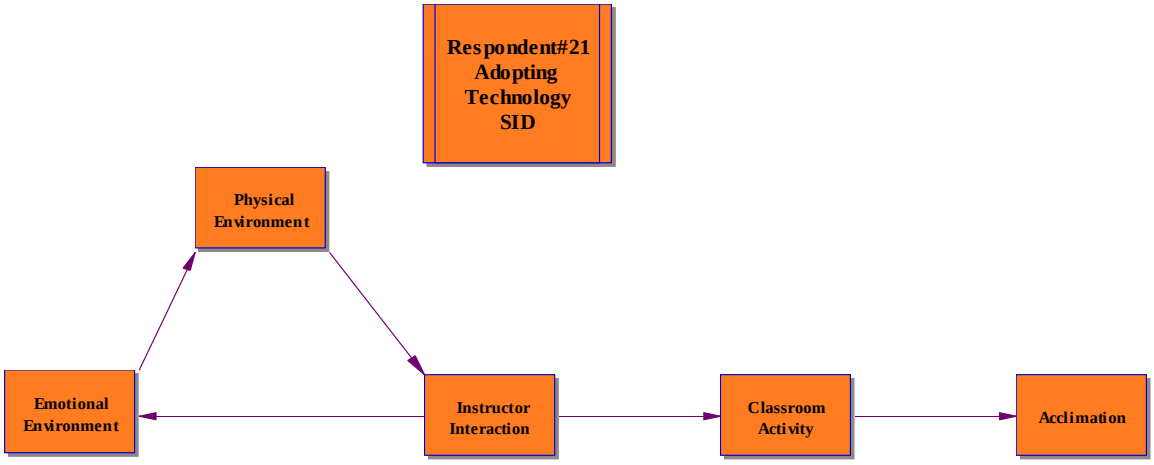
Activity
Emotional
Environment
Acclimation


Respondent#21
Adopting
Technology
SID
Physical
Environment
Emotional
Environment
Instructor
Interaction
Classroom
Activity
Acclimation

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